REVISION 0

FIVE-YEAR REVIEW REPORT

THIRD FIVE-YEAR REVIEW REPORT FOR FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP) ST. LOUIS SITES

ST. LOUIS, MISSOURI

JULY 31, 2015

U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

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JULY 31, 2015

prepared by:

U.S. Army Corps of Engineers, St. Louis District Office
Formerly Utilized Sites Remedial Action Program

with assistance from:

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ACRONYMS AND ABBREVIATIONS

Both English and metric units are used in this report. The units used in a specific situation are based on common unit usage or regulatory language (e.g., depths are given in feet and meters, and areas are given in square feet and square meters). Acres are given for area when applicable.

µCi/mL	microcuries per milliliter
µg/L	microgram(s) per liter
µg/m^3	microgram(s) per cubic meter
µm	micrometer
6E	6 East
7E	7 East
7N	7 North
7S	7 South
7W	7 West
1997 HEAST	*Health Effects Assessment Summary Tables (HEAST), FY 1997 Update*
2001 HEAST	*Health Effects Assessment Summary Tables (HEAST)*
2011 Exposure Factors Handbook	*Exposure Factors Handbook: 2011 Edition*
ABS	absorption fraction
Ac	actinium
ADAF	Age-Dependent Adjustment Factors
ADM	Archer Daniels Midland
AEC	Atomic Energy Commission
AF	adherence factor
ANSI	American National Standards Institute
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
ATD	alpha track detector
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BMP	best management practice
BNI	Bechtel National Inc.
BNSF	Burlington Northern Santa Fe
CALEPA	California Environmental Protection Agency
CB&I	Chicago Bridge and Iron (formerly Shaw Environmental Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
Ci	curie(s)
CIP	*Community Involvement Plan for the St. Louis FUSRAP Sites, Revision 0, for St. Louis, Missouri*
cm	centimeter(s)
cm^2	square centimeter(s)
cm^3/g	cubic centimeter(s) per gram
CNS	central nervous system
COC	contaminant of concern

ACRONYMS AND ABBREVIATIONS (Continued)

community relations plan	*Community Relations Plan for the St. Louis FUSRAP Sites, Revision 4, for St. Louis, Missouri*
CR	cancer risk
CSR	*Code of State Regulations*
CSF	cancer slope factor
CSF_d	dermal cancer slope factor
CSF_i	inhalation cancer slope factor
CSF_o	oral cancer slope factor
CWC	Coldwater Creek
CY	calendar year
DCAL	dose and risk calculation (software)
DCF	dose conversion factor
DDE	deep dose equivalent
DOE	U.S. Department of Energy
dpm/100 cm^2	disintegrations per minute per 100 square centimeters
ED	exposure duration
EDE	effective dose equivalent
EE/CA	engineering evaluation/cost analysis
EH	East Half
EMDAR	Environmental Monitoring Data and Analysis Report
EPC	exposure point concentration
FGR	Federal Guidance Report
FSS	final status survey
FSSE	final status survey evaluation
ft	foot/feet
ft^2	square foot/feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
Futura	Futura Coatings Company
FY	fiscal year
g	gram(s)
g/cm^3	gram(s) per cubic centimeter
g/m^3	gram(s) per cubic meter
GIABS	gastrointestinal absorption factor
GIFREHC	General Investment Funds Real Estate Holding Company
GRAAA	ground-water remedial action alternative assessment
GSN	Gunther Salt North
GSS	Gunther Salt South
GWS	gamma walkover survey
HI	hazard index
HISS	Hazelwood Interim Storage Site
HISS EA EE/CA	*Engineering Evaluation/Cost Analysis – Environmental Assessment for the Proposed Decontamination of Properties in the Vicinity of the Hazelwood Interim Storage Site, Hazelwood, Missouri*
HISS EE/CA	*Engineering Evaluation/Cost Analysis (EE/CA) for the Hazelwood Interim Storage Site (HISS)*
HR	hazard ratio

ACRONYMS AND ABBREVIATIONS (Continued)

HWSA	hazardous waste storage area
HU	hydrostratigraphic unit
HZ	hydrostratigraphic zone
I	Interstate
IA	investigation area
ICRP	International Commission on Radiological Protection
IL	investigative limit
Initial Five-Year Review Report	*Five-Year Review Report: Initial Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites*
ISOU	Inaccessible Soil Operable Unit
IRIS	Integrated Risk Information System
IT	IT Corporation
IUR	inhalation unit risk
kg	kilogram(s)
L	liter(s)
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
m^3/kg	cubic meter(s) per kilogram
m^3-year/kg-day	cubic meter-year per kilogram-day
Mallinckrodt	Mallinckrodt LLC
MARSSIM	*Multi-Agency Radiation Survey and Site Investigation Manual*
MB	mass-balance
McDonnell Boulevard	James S. McDonnell Boulevard
MCL	maximum contaminant level
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
mg	milligram(s)
mg/cm^2	milligram(s) per square centimeter
mg-day/kg-year	milligram-day per kilogram-year
mg/kg	milligram(s) per kilogram
mg/kg-day	milligram(s) per kilogram-day
mg/m^3	milligram(s) per cubic meter
MoDOT	Missouri Department of Transportation
MOU	Memorandum of Understanding
mrem	millirem
mrem/pCi	millirem per picocurie
mrem/yr	millirem per year
MSD	Metropolitan St. Louis Sewer District
NC EMDAR CY 2009	*North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009*
NC FS	*Feasibility Study for the St. Louis North County Site*
NC PP	*Proposed Plan for the St. Louis North County Site*
NC ROD	*Record of Decision for the North St. Louis County Sites*
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

ACRONYMS AND ABBREVIATIONS (Continued)

ND	nondispersion
NESHAP	National Emission Standards for Hazardous Air Pollutants
NJDEP	New Jersey Department of Environmental Protection
NORM	naturally occurring radioactive materials
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NTP	National Toxicology Program
O&M	operations and maintenance
OPP	Office of Pesticide Programs
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
Pa	protactinium
Pb	lead
pCi	picocurie(s)
pCi/g	picocurie(s) per gram
pCi/L	picocurie(s) per liter
PDI	pre-design investigation
PDIR	pre-design investigation report
PEF	particulate emission factor
PPE	personal protective equipment
PPRTV	Provisional Peer-Reviewed Toxicity Values
PRAR	post-remedial action report
PRG	preliminary remediation goal
Ra	radium
RAGS Part A	*Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)*
RAGS Part E	*Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Assessment)*
RAGS Part F	*Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)*
RAIS	Risk Assessment Information System
RAO	remedial action objective
RAS	remedial action summary
RAWD	remedial action work description
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RESRAD	RESidual RADioactivity (computer model)
RfC	reference concentration
RfD	reference dose
RfD_d	dermal reference dose
RfD_i	inhalation reference dose
RfD_o	oral reference dose
RFI	Resource Conservation and Recovery Act Facility Investigation

ACRONYMS AND ABBREVIATIONS (Continued)

RG	remediation goal
RI	remedial investigation
Rn	radon
ROD	record of decision
ROE	right of entry
ROW	right-of-way
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act of 1986
Second Five-Year Review Report	*Five-Year Review Report: Second Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites*
SLAPS	St. Louis Airport Site
SLAPS EE/CA and Action Memorandum	*Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum*
SLAPS Interim Action EE/CA	*St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA)*
SLAPS PRAR-FSSE	*Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site, Includes Investigation Areas 01 Through 07, Investigation Area 08: South Ditch, Parts of Investigation Areas 11 and 12, and Coldwater Creek: West of IA-01*
SLDS	St. Louis Downtown Site
SLDS EE/CA	*Engineering Evaluation/Cost Analysis for Decontamination of the St. Louis Downtown Site*
SLDS FS	*Feasibility Study for the St. Louis Downtown Site*
SLDS ISOU Group 1 ROD	*Record of Decision for the Inaccessible Soil Operable Unit Associated with Group 1 Properties at the St. Louis Downtown Site*
SLDS ISOU RI/BRA Report	*Remedial Investigation and Baseline Risk Assessment Report for the Inaccessible Soil Operable Unit at the St. Louis Downtown Site*
SLDS ROD	*Record of Decision for the St. Louis Downtown Site*
SLS	St. Louis Sites
SLS RI Report	*Remedial Investigation Report for the St. Louis Site*
SLS RI Addendum	*Remedial Investigation Addendum for the St. Louis Site*
SOR	sum of ratios
SOR_G	gross sum of ratios
SOR_N	net sum of ratios
SSLF	Soil Storage and Loadout Facility
STLAA	St. Louis Airport Authority
SU	survey unit
TEDE	total effective dose equivalent
Th	thorium
TLD	thermoluminescent dosimeter
TRRA	Terminal Railroad Association
U	uranium
UCL_{95}	95 percent upper confidence limit

ACRONYMS AND ABBREVIATIONS (Continued)

USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UUUE	unlimited use and unrestricted exposure
VP	vicinity property
WH	West Half
WL	working level
WQC	water quality criteria
yd^3	cubic yard

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EXECUTIVE SUMMARY

As the lead agency for the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites (SLS), the U.S. Army Corps of Engineers, St. Louis District (USACE) conducted a five-year review of the response actions conducted at the SLS pursuant to Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The USACE is conducting these response actions pursuant to the CERCLA and the NCP under the legislative authority contained in the Energy and Water Development Appropriations Act, Public Law 106-60, §611 (HR 2605), for fiscal year (FY) 2000. This is the third five-year review conducted for the SLS. The period covered by this review is from January 2009 through December 2013.

The SLS consists of two locations/operable units (OUs) designated as the St. Louis Downtown Site (SLDS) and the North St. Louis County Sites that contain radiological and chemical contamination resulting from previous Manhattan Engineer District/Atomic Energy Commission (MED/AEC) operations. The SLDS is comprised of the Mallinckrodt LLC (Mallinckrodt) property and the 39 surrounding vicinity properties. This site is located near the Mississippi River, north of downtown St. Louis, Missouri. The selected remedy presented in the *Record of Decision for the St. Louis Downtown Site* (SLDS ROD) (USACE 1998a) requires the excavation and disposal of radiological and chemical contamination in surface and subsurface accessible soil resulting from MED/AEC processing activities. The selected remedy also includes monitoring of the Mississippi Alluvial Aquifer.

Table ES-1 lists the SLDS remedial activities conducted through December 2013.

Table ES-1. Summary of Remedial Actions Conducted at the SLDS

Location	Property	Start	Complete	Volume Removed (yd^3)
Mallinckrodt	Plant 2[a]	October 1998	August 2000	9,659
	Additional remediation associated with sewer lines at Plant 2[b]	June 2011	In Progress	*
DT-2	City Property Vicinity Property (VP)[b,c]	October 1998	In Progress	55,510
Mallinckrodt	Plant 1	July 2000	September 2003	2,410
Mallinckrodt	Plants 6 East Half (EH) and 6 East (6E)	December 2000	July 2008	23,085
	Additional remediation in Plant 6EH conducted concurrently with Building 101 remediation at Plant 6 West Half (WH)	December 2012	In Progress	*
DT-7	Midwest Waste VP	May 2001	January 2003	3,910
DT-6	Heintz Steel and Manufacturing VP	April 2003	March 2004	1,660
	Additional remediation associated with storage building	December 2009	December 2009	150
DT-10	Thomas and Proetz Lumber Company VP	June 2003	June 2006	1,995
Mallinckrodt	Plant 7 East (7E)	July 2003	September 2003	1,775
DT-11	City of Venice, Illinois (formerly McKinley Bridge) VP (currently owned by the Illinois Department of Transportation and the Missouri Department of Transportation [MoDOT])	October 2003	January 2004	2,834
Mallinckrodt	Plant 6WH[b]			
	Phase 1	June 2004	December 2004	3,513
	Phases 2A (Rail Spur Area) and 2C (North of Building 101)	2005	2007	*
	Phase 2B	March 2008	November 2010	30,300
	Building 101	December 2012	In Progress	*

Table ES-1. Summary of Remedial Actions Conducted at the SLDS (Continued)

Location	Property	Start	Complete	Volume Removed (yd^3)
DT-29	Midtown Garage VP	October 2004	October 2004	51
Mallinckrodt	Plant 7 North (7N)	February 2005	August 2006	14,324
	Plant 7N (Hazardous Waste Storage Area Footprint, Survey Unit [SU]-9)	November 2010	July 2011	2,240
Mallinckrodt	Plant 7 South (7S)	February 2005	March 2007	3,630
	Additional remediation of small area in Plant 7S conducted during remediation of DT-12	July 2010	November 2010	150
DT-4	Gunther Salt VP			
	Gunther Salt South (GSS)[d]	April 2006	December 2011	426
	Gunther Salt North (GSN)	October 2006	August 2007	2,445
Mallinckrodt	Plant 9 and Security Gate Number 49 Area	July 2006	August 2006	22
DT-8	PSC Metals, Inc. VP	September 2006	March 2008	8,071
DT-17	Christiana Court, LLC VP	August 2007	August 2007	47
DT-3	Norfolk Southern Railroad VP	October 2007	November 2007	243
NA	Terminal Railroad Association (TRRA) Soil Spoils Area	August 2008	August 2008	147
DT-9	TRRA VP	February 2009	June 2009	2,440
DT-12	Burlington Northern Santa Fe (BNSF) Railroad VP	May 2010	September 2011	2,290[e]
Mallinckrodt	Plant 7W[b] – 700 Pad	April 2011	May 2012	10,150
NA	Kiesel Hall Street Property	May 2013	In Progress	*
NA	Kiesel Riverfront Property	January 2011	March 2011	267

* Final volume removed is not available as the remedial action is in progress and/or the post-remedial action report and final status survey evaluation (PRAR-FSSE) report for this area is not yet completed.

[a] With the exception of remedial actions associated with a formerly inaccessible sewer line at Plant 2, all remedial actions have been completed at Plant 2.

[b] Additional remediation activities are planned for these properties, so the associated soil volumes shown do not necessarily represent final volumes removed. Rather, for these properties, the volumes presented represent the amount of soil removed between the "Start" and "Complete" dates shown.

[c] In July 1999, a remedial action was completed west of the levee in the central and southern portions of DT-2. Between March 2009 and December 2011, an additional remedial action was completed for the portion of DT-2 located west of the levee in the Destrehan Street right-of-way (ROW) between the west toe of the levee and the BNSF Railroad VP (DT-12). Remediation of the remaining portions of DT-2 located east of the levee is ongoing.

[d] Remediation was initially conducted at GSS between April and July 2006 (382 yd^3 [292.1 cubic meters (m^3)]). Additional remediation was conducted at GSS between May 2010 and December 2011 to address a contaminated area located along the eastern property line adjacent to DT-12 (44 yd^3 [33.6 m^3]).

[e] Volume removed for DT-12 also includes a small portion of the adjacent Plant 7S and Plant 7N properties, as well as a portion of the Destrehan Street ROW.

Notes:

Shaded properties are those in which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

This table does not include properties for which remedial actions were not required.

NA = Not Applicable, yd^3 = cubic yards (in situ)

For the SLDS, a Ground-Water Remedial Action Alternative Assessment (GRAAA) was initiated because concentrations of arsenic and uranium in ground-water samples collected from the Mississippi Alluvial Aquifer exceeded investigative limits (ILs) established in the SLDS ROD. The conclusion of Phase 1 of the GRAAA (assessment) was that Phase 2 of the GRAAA (investigation) should be conducted (USACE 2003c). Phase 2 will be initiated following completion of remedial activities at Plant 6WH in order to assess if remediation results in a decrease in the contaminant of concern (COC) concentrations in hydrostratigraphic unit (HU)-B ground water. The ground-water monitoring data collected at the SLDS and reviewed in the annual Environmental Monitoring Data and Analysis Reports (EMDARs) will be used to provide additional information for Phase 2 of the GRAAA. Phase 2 of the GRAAA will be addressed in a subsequent five-year review.

The North St. Louis County Sites are located near the Lambert – St. Louis International Airport in St. Louis County, Missouri, and are comprised of the following properties:

- the Latty Avenue Properties, including the Hazelwood Interim Storage Site (HISS), Futura Coatings Company (Futura), and eight vicinity properties (VPs);
- the St. Louis Airport Site (SLAPS); and
- the SLAPS VPs, consisting of approximately 78 properties between the SLAPS, the HISS, Coldwater Creek (CWC), and the properties along CWC.

In October 1989, the USEPA placed three of the North St. Louis County Sites properties (the SLAPS, the HISS, and Futura) on the National Priorities List (NPL) (CERCLIS No. MOD980633176). Removal actions have been conducted at several areas in the North St. Louis County Sites. The removal actions were evaluated in engineering evaluation/cost analyses (EE/CA) documents and subsequently were authorized by action memoranda. Removal actions at the SLAPS were evaluated and authorized in accordance with the following EE/CAs and action memoranda:

- *St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA)* (DOE 1997a).
- *SLAPS Action Memorandum for the Removal of Radioactively Contaminated Material* (DOE 1997b).
- *Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum* (USACE 1999a).

Removal actions for the SLAPS VPs were evaluated in the *Engineering Evaluation/Cost Analyses - Environmental Assessment for the Proposed Decontamination of Properties in the Vicinity of the Hazelwood Interim Storage Site* (HISS EA EE/CA) (DOE 1992) and approved in a subsequent action memorandum (DOE 1995a).

The *Record of Decision for the North St. Louis County Sites* (NC ROD) (USACE 2005a) was issued on September 2, 2005. The selected remedy presented in the NC ROD requires the excavation and disposal of radiological and chemical contamination in accessible soil resulting from MED/AEC processing activities. The other components of the selected remedy include:

- Use restrictions at areas under roads, active rail lines, and other permanent structures at which the residual condition is not consistent with unlimited use and unrestricted exposure (UUUE);
- Dredge contaminated sediments from CWC to remediation goals (RGs) that support UUUE;
- Monitor ground water long-term in selected areas in which soils contaminated above RGs are left in place or in which contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

After September 2, 2005, a remedial action was implemented at the North St. Louis County Sites under the NC ROD (USACE 2005a).

A remedial action under the NC ROD was completed at the HISS and Futura during the period of this review (January 2009 through December 2013). In addition, remedial actions were conducted at three Latty Avenue VPs during this period. Table ES-2 summarizes the response actions conducted at the Latty Avenue Properties.

Table ES-2. Summary of Response Actions Conducted at the Latty Avenue Properties

Designation	Start	Complete	Volume Removed (yd^3)
HISS Removal Action (Stockpile Removal)	November 1999	October 2001	39,485
VP-02(L)	March 2000	August 2011	15,434
VP-01(L) and Parcel 10K530087	January 2007	January 2008	11,017
VP-40A (partial)	March 2007	November 2011	29,714
HISS Remedial Action (In Situ Soil)	January 2008	October 2011	53,800
Futura (Soil)	January 2008	October 2011	20,950
VPs 03(L) through 06(L)	February 2008	March 2008	3
Futura (Buildings)	April 2012	January 2013	103,560[a]
VP-01(L) Interior of Buildings	March 2013	August 2013	83

[a] Waste materials and construction debris (including pavement, utilities, and miscellaneous debris)

Note:

Shaded properties are those in which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

All removal actions and remedial actions at the SLAPS were completed prior to this five-year review period (i.e., prior to January 2009). Remedial actions were performed at several of the SLAPS VPs during the period of this review (January 2009 through December 2013). Table ES-3 summarizes the response actions conducted at the SLAPS and SLAPS VPs through December 2013.

Table ES-3. Summary of Response Actions Conducted at the SLAPS and SLAPS VPs

Designation	Start	Complete	Volume Removed (yd^3)
The SLAPS	September 1998	January 2007	420,538
CWC VP - St. Denis Bridge Area Utility Support	November 1998	November 1998	193[a,b]
IA-12	June 1999	July 2008	16,719
VP-38 (partial)[c]	November 1999	June 2000	4,620 (Removal Action)
	February 2009	May 2009	1,440 (Remedial Action)
VP-24 (Removal Action)	May 2002	May 2002	95
VP-04(C) and VP-05(C) (partial)[c]	March 2004	July 2004	71[b]
James S. McDonnell Boulevard (McDonnell Boulevard) ROW Adjacent to VP-13	June 2004	July 2004	1,296
IA-09 Ballfield Hotspot (Phases 1, 2, and 2B Partial)	September 2005	September 2005	730[c]
VP-08(C) (partial) [c]	June 2007	October 2007	4,892 (Eastern Portion of Property)
IA-13	June 2008	September 2008	2,802
VP-08 and VP-09	June 2008	June 2008	252
Hazelwood Avenue VPs[d]	May 2009	March 2010	943
VP-63	March 2010	April 2010	70
VP-54	March 2010	April 2010	65
VP-55	April 2010	April 2010	228
VP-53	April 2010	June 2010	104
VP-05 and VP-06	May 2010	August 2010	42
VPs 10, 11, and 12	June 2010	May 2011	2,720[e]
IA-10 and CWC Area North of McDonnell Boulevard	2011 [f]	In Progress	*
McDonnell Boulevard East Section (b) ROW	September 2010	March 2011	434
VP-31A	February 2011	May 2011	34
IA-09 Ballfields (Phases 1, 2, and 2B Partial)[c]	November 2011	In Progress	*

Table ES-3. Summary of Response Actions Conducted at the SLAPS and SLAPS VPs (Continued)

Designation	Start	Complete	Volume Removed (yd^3)
Frost Avenue ROW Adjacent to VP-21	January 9, 2012	January 26, 2012	26 (soil) 33 (waste and construction debris)
VP-16	May 2013	June 2013	68[g]
Norfolk Southern/Eva Loadout Facility[c]	May 2013	In Progress	
Banshee Road	September 2013	September 2013	1

* Final volume removed is not available as the remedial action is in progress.

[a] Excavation was conducted in conjunction with replacement of the St. Denis Street Bridge.

[b] Excavation was conducted in conjunction with utility work.

[c] Remediation is not complete. Additional sampling is planned for these properties.

[d] Hazelwood Avenue VPs include Hazelwood Avenue; the Hazelwood Avenue ROW (partial); and VPs 32, 35, 35a, 36, 39, 40, 42, and 47.

[e] Soil volume represents the in-situ volume removed from VP-12 during this review period. An additional 35 in situ yd^3 (26.8 m^3) of contaminated materials were removed from VP-10 between October 30 and November 14, 2003.

[f] Additional remediation was conducted in 2011 in the CWC Area North of McDonnell Boulevard during remediation of an adjacent property, VP-12.

[g] Soil volume represents combined quantities from both VP-16 and an adjacent portion of the Norfolk Southern/Eva Loadout Facility.

Notes:

Shaded properties are those in which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

This table does not include properties for which remedial actions were not required.

This five-year review is required by CERCLA Section 121 and the NCP, because the remedial actions result in hazardous substances, pollutants, or contaminants remaining at the SLDS and the North St. Louis County Sites above levels that meet the criteria for unrestricted use. This five-year review comes at a time when site response actions are being implemented and construction is ongoing. This review, therefore, is not typical of the reviews that will be conducted over the long-term management period. The typical long-term management five-year review process is designed to examine remedies that are in place. In the future, after construction completion, five-year review reports will examine land use, institutional control monitoring and enforcement, long-term monitoring, and other long-term management activities.

The assessment of this five-year review determined that the remedial action implemented at the SLDS is in accordance with the requirements of the SLDS ROD. Likewise, this five-year review found that the North St. Louis County Sites remedial action is being conducted in accordance with the NC ROD.

The response actions implemented to date at the SLDS and the North St. Louis County Sites are functioning as designed and will be protective of human health and the environment upon attainment of the cleanup goals. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name: Formerly Utilized Sites Remedial Action Program (FUSRAP) - St. Louis Sites (SLS)

EPA ID: MOD980633176

Region: 7	**State:** MO	**City/County:** St. Louis

SITE STATUS

NPL status: St. Louis Airport Sites (SLAPS), Hazelwood Interim Storage Site (HISS), and Futura Coatings Company (Futura)

☒ Final · Deleted · Other (specify)

Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS

Lead agency: U.S. Army Corps of Engineers (USACE)

Author name: USACE, St. Louis District Office

Author affiliation: USACE, St. Louis District

Review period: 11/07/2012 – 07/31/2015

Date(s) of site inspection:
North St. Louis County Sites: November 7, 2012
St. Louis Downtown Site (SLDS): November 8, 2012

Type of review: Statutory

Review number: 3 (Third)

Triggering action: Signature date of Second Five-Year Review Report

Triggering action date: 09/28/2010

Due date *(five years after triggering action date)*: 09/28/2015

Five-Year Review Summary Form (Continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:

Not Applicable

Issues/Recommendations Identified in the Five-Year Review:

OU(s):	Issue Category: Monitoring
SLDS Accessible Soil and Ground-Water Operable Unit (OU)	**Issue:** Exceedance of the Investigative Limits (ILs) in hydrostratigraphic unit (HU)-B Ground Water: Ground-water monitoring results indicate that total uranium (U) and arsenic concentrations are exceeding the ILs in HU-B ground water, also known as the Mississippi Alluvial Aquifer. The Ground-Water Remedial Action Alternative Assessment (GRAAA) was initiated in 2002, following significant exceedance of the total uranium IL in monitoring well DW19 for an extended period. The phases of the GRAAA consist of assessment (Phase 1), investigation (Phase 2), feasibility (Phase 3), and proposed remediation (Phase 4). Phase 1 of the GRAAA was completed in 2003. Based on the results of the Phase 1 GRAAA and the continued exceedance of the ILs for arsenic and total U in HU-B ground water, there is a need to proceed with Phase 2. Phase 2 of the GRAAA has not yet been initiated because remediation of potential sources of the elevated contaminant of concern (COC) concentrations detected in HU-B ground water, such as contaminated soil located beneath Building 101, is not yet complete.
	Recommendation: If circumstances warrant, Phase 2 of the GRAAA is recommended to be initiated following completion of the remedial activities at Plant 6WH to evaluate the fate and transport of Manhattan Engineer District/Atomic Energy Commission (MED/AEC) COCs in ground water.

Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	USACE	U.S. Environmental Protection Agency (USEPA)/State	Calendar Year (CY) 2018

Five-Year Review Summary Form (Continued)

Issues/Recommendations Identified in the Five-Year Review (Continued):

OU(s):	Issue Category: Monitoring
North St. Louis County Sites	**Issue:** Total U concentrations in shallow ground-water monitoring wells exceed the *Record of Decision for the North St. Louis County Sites* (NC ROD) monitoring guideline at the SLAPS: Ground-water monitoring results indicate that total U consistently exceeds the 30 micrograms per liter (µg/L) monitoring guideline established in the NC ROD in shallow (HZ-A) ground water at the western edge of the SLAPS. At this time, monitoring of surface water and sediments in CWC indicate that significant transport of total U from HZ-A into CWC is not occurring.
	Recommendation: Evaluation of the condition of monitoring well PW46, located at the western edge of the SLAPS, is recommended to determine if well conditions are responsible for the elevated total U concentrations. The evaluation should be used to determine if well decommissioning and replacement are necessary.

Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	USACE	USEPA/State	CY 2018

Five-Year Review Summary Form (Continued)

Protectiveness Statement(s)

Operable Unit	*Protectiveness Determination*	*Addendum Due Date (if applicable)*
SLDS Accessible Soil and Ground-Water OU	**Will be protective**	**Not Applicable**

Protectiveness Statement: Pursuant to USEPA guidance, the USACE, in coordination with the USEPA, has completed the third five-year review for the St. Louis FUSRAP Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use. This review evaluates the protectiveness of the SLDS Accessible Soil and Ground-Water OU remedy.

The remedial action of the SLDS Accessible Soil and Ground-Water OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the SLDS may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of SLDS workers and other potential exposure groups. Therefore, the remedy at the SLDS Accessible Soil and Ground-Water OU is expected to be protective of human health and the environment upon completion.

Operable Unit	*Protectiveness Determination*	*Addendum Due Date (if applicable)*
North St. Louis County Sites	**Will be protective**	**Not Applicable**

Protectiveness Statement: Pursuant to USEPA guidance, the USACE, in coordination with the USEPA, has completed the third five-year review for the St. Louis FUSRAP Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UUUE). This review evaluates the protectiveness of the North St. Louis County Sites OU remedy.

The remedial action of the North St. Louis County Sites OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the North St. Louis County Sites may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of North St. Louis County Sites workers and other potential exposure groups. Therefore, the remedy at the North St. Louis County Sites OU is expected to be protective of human health and the environment upon completion.

STATEMENT OF PROTECTIVENESS

Protectiveness Statement (St. Louis Downtown Site)

Pursuant to U.S. Environmental Protection Agency (USEPA) guidance, the U.S. Army Corps of Engineers (USACE), in coordination with the USEPA, has completed the third five-year review for the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use. This review evaluates the protectiveness of the St. Louis Downtown Site (SLDS) Accessible Soil and Ground-Water Operable Unit (OU) remedy.

The remedial action of the SLDS Accessible Soil and Ground-Water OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the SLDS may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of SLDS workers and other potential exposure groups. Therefore, the remedy at the SLDS Accessible Soil and Ground-Water OU is expected to be protective of human health and the environment upon completion.

Protectiveness Statement (North St. Louis County Sites)

Pursuant to USEPA guidance, the USACE, in coordination with the USEPA, has completed the third five-year review for the St. Louis FUSRAP Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UUUE). This review evaluates the protectiveness of the North St. Louis County Sites OU remedy.

The remedial action of the North St. Louis County Sites OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the North St. Louis County Sites may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of North St. Louis County Sites workers and other potential exposure groups. Therefore, the remedy at the North St. Louis County Sites OU is expected to be protective of human health and the environment upon completion.

For the United States Army:

_____

Anthony P. Mitchell — Date
Colonel, U.S. Army
District Commander

I. INTRODUCTION

A five-year review has been conducted for the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites (SLS). This five-year review comes at a time when site response actions are being implemented and construction is ongoing. This review, therefore, is not typical of the reviews that will be conducted over the long-term management period. The typical long-term management five-year review process is designed to examine remedies that are in place. In the future, after construction is complete, five-year review reports will examine land use, institutional control monitoring and enforcement, long-term monitoring, and other long-term activities.

The SLS are composed of two locations designated as the St. Louis Downtown Site (SLDS) and the North St. Louis County Sites. This is the third five-year review conducted for the SLS. The U.S. Environmental Protection Agency's (USEPA's) *Comprehensive Five-Year Review Guidance* recommends that subsequent five-year review reports be prepared within 5 years of the signature date of the previous review (USEPA 2001a). The triggering date for this review is the signature date of the *Five-Year Review Report: Second Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites* (Second Five-Year Review Report) (USACE 2010a), which is September 28, 2010. The period covered by the *Five-Year Review Report: Initial Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites* (Initial Five-Year Review Report) (USACE 2004a) is September 1998 through August 2003. The period covered by the Second Five-Year Review Report is from September 2003 through December 2008. The period covered by this review is January 2009 through December 2013. Preparation of this review began with the start of site inspections that were conducted by the USACE on November 7, 2012, in accordance with USEPA guidance (USEPA 2001a), and was completed on July 31, 2015, with the submittal of this final version of the Third Five-Year Review Report. The methods, findings, recommendations, and conclusions of the five-year review are documented in this five-year review report.

As the lead agency for the SLS, the U.S. Army Corps of Engineers (USACE) St. Louis District prepared this five-year review report pursuant to Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan (NCP). CERCLA §121 (c) states the following:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The USEPA interpreted this requirement further in the NCP at 40 *Code of Federal Regulations (CFR)* 300 (specifically 40 *CFR* 300.430[f][4][ii]), which states the following:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and

> unrestricted exposure [UUUE], the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The USACE conducted the third five-year review of the remedial actions implemented at the SLDS Accessible Soil and Ground-Water Operable Unit (OU) and the response actions implemented at the North St. Louis County Sites in St. Louis, Missouri. This review covers the period from January 2009 through December 2013. The results of the review are documented in this report. The USACE was assisted in the five-year review by the USEPA Region 7 and the Missouri Department of Natural Resources (MDNR). The USEPA Region 7 and the MDNR provided comments and suggestions on the analyses presented in this five-year review report.

On November 7 and 8, 2012, site inspections were conducted by the USACE at the SLDS and the North St. Louis County Sites as part of the five-year review. Representatives of the USACE, USEPA Region 7, and MDNR participated in the site inspections.

The initial and second five-year reviews of the SLDS Accessible Soils and Ground-Water OU (addressing the periods from September 1998 through August 2003 and from September 2003 through December 2008, respectively) were conducted pursuant to statute, because the remedial action at this OU is a post-SARA remedial action that, when complete, will leave hazardous substances, pollutants, or contaminants onsite above levels that allow for UUUE. The third five-year review of the SLDS Accessible Soil and Ground-Water OU, addressing the period from January 2009 through December 2013, is also being conducted as a statutory review.

There is yet no triggering action for conducting a five-year review for the other OU at the SLDS, the Inaccessible Soil Operable Unit (ISOU). The media that comprise the ISOU (i.e., inaccessible soil, soil adjacent to sewer lines, sediment inside the sewer lines, and soil on building/structural surfaces) are being addressed under separate, ongoing CERCLA actions and are outside the scope of this five-year review. The SLDS ISOU Group 1 includes those properties with ISOU media that do not pose an unacceptable risk to human health and the environment. The USACE has developed the *Record of Decision for the Inaccessible Soil Operable Unit Associated with Group 1 Properties at the St. Louis Downtown Site* (SLDS ISOU Group 1 ROD) (USACE 2014a), in coordination with the USEPA Region 7 and with concurrence from the MDNR. The remaining properties in the ISOU (i.e., Group 2) are currently being evaluated and will be addressed under a future CERCLA action.

The initial five-year review of the North St. Louis County Sites (addressing the period from September 1998 through August 2003) was conducted as a matter of USEPA policy, because a removal action was taking place at a site that is on the National Priorities List (NPL) (the St. Louis Airport Site [SLAPS], the Hazelwood Interim Storage Site [HISS], and the Futura Coatings Company [Futura]). On September 2, 2005, the *Record of Decision for the North St. Louis County Sites* (NC ROD) (USACE 2005a) was finalized and signed by the USACE and the USEPA. After September 2, 2005, the effective date of the NC ROD, a remedial action was initiated at the North St. Louis County Sites. The Second Five-Year Review Report addressed the period from September 2003 through December 2008 (USACE 2010a). The second five-year review of the North St. Louis County Sites was conducted pursuant to statute, because the remedial action at this OU is a post-SARA remedial action that, when complete, will leave hazardous substances, pollutants, or contaminants onsite above levels that allow for UUUE. The third five-year review of the North St. Louis County Sites, addressing the period from January 2009 through December 2013, is also being conducted as a statutory review.

II. SITE CHRONOLOGY

A summary of the SLS chronology of site events is presented in Table II-1. The shaded events are applicable to this five-year review period.

Table II-1. Chronology of Site Events

Site	Event	Date
SLDS	Mallinckrodt Chemical Works performed work under contract to the Manhattan Engineer District/Atomic Energy Commission (MED/AEC)	1942 – 1957
North County	The SLAPS: Acquired by MED/AEC to store uranium-bearing residues and scrap from the SLDS	1946
SLDS	Mallinckrodt LLC (Mallinckrodt) Plants 1 and 2: Decontaminated to meet AEC criteria then in effect	1948 – 1950
SLDS	Plants 1 and 2: AEC released for use without radiological restrictions	1951
SLDS	AEC managed decontamination efforts in Mallinckrodt Plants 10, 7, and 6 East (6E) to meet criteria then in effect; plants returned to Mallinckrodt for use without radiological restrictions	1962
North County	Continental Mining and Milling Company of Chicago, Illinois, purchased and began moving wastes from the SLAPS to the HISS	1966
North County	The HISS: Used to store radioactive material purchased from the AEC prior to shipment to Colorado	1966 – 1973
North County	The SLAPS: Ownership transferred from MED/AEC to St. Louis Airport Authority (STLAA)	1973
North County	The HISS: Radiological surveys conducted by the U.S. Nuclear Regulatory Commission (NRC) indicated the presence of residual uranium and thorium concentrations in the soil above guidelines for unrestricted use of land areas	1976
North County	The SLAPS: The U.S. Department of Energy (DOE) performed a radiological survey and found elevated radionuclide levels onsite and north of the site in ditches north and south of James S. McDonnell Boulevard (McDonnell Boulevard)	1976 and 1978
SLDS	Radiological survey conducted by Oak Ridge National Laboratory (ORNL) found alpha and radiological levels in excess of the criteria for unrestricted use of the property (ORNL 1981)	1977
North County	The HISS: Contaminated soil from the adjacent Futura parcel stockpiled on the HISS in support of construction of a manufacturing facility	1979
North County	The HISS: The DOE performed response actions including clearing, excavating, and stockpiling contaminated soil from excavation of the property at 9200 Latty Avenue (Futura)	1984
North County	The HISS: Supplemental pile is created as the result of DOE radiological monitoring support of Latty Avenue drainage and street improvements	1986
North County	NPL: The USEPA placed the SLAPS, the HISS, and Futura on the NPL	Oct. 4, 1989
SLDS	The DOE issued *Engineering Evaluation/Cost Analysis for Decontamination of the St. Louis Downtown Site* (SLDS EE/CA) (DOE 1991)	May 1991
North County	The DOE issued *Engineering Evaluation/Cost Analysis – Environmental Assessment for the Proposed Decontamination of Properties in the Vicinity of the Hazelwood Interim Storage Site, Hazelwood, Missouri*, Rev. 1 (HISS EA EE/CA) (DOE 1992)	March 1992
SLDS	The DOE submitted the *Remedial Investigation Report for the St. Louis Site* (SLS RI Report) (DOE 1994)	1994
SLDS	Interim action at Mallinckrodt: 50 Series Buildings - decontamination, demolition, and crushing pursuant to the SLDS EE/CA	1996
SLDS	Interim action at Mallinckrodt: Plants 6 and 7 - decontamination, asbestos abatement, demolition to floor elevation grade, and crushing, pursuant to the SLDS EE/CA	1997
SLDS	Interim action at Mallinckrodt: Plant 10 area - subsurface soil excavation and off-site shipment pursuant to the SLDS EE/CA	1997
SLDS	Interim action at City Property Vicinity Property (VP) (DT-2): St. Louis Riverfront Trail area – excavation and off-site shipment pursuant to the SLDS EE/CA	1997

Table II-1. Chronology of Site Events (Continued)

Site	Event	Date
North County	The DOE issued *St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA)*, Final (SLAPS Interim Action EE/CA) (DOE 1997a)	Sept. 1997
North County	Removal action at the SLAPS: West End – excavation and removal of contaminated soil east of Coldwater Creek (CWC) bank gabion wall on the SLAPS pursuant to the SLAPS Interim Action EE/CA	1997
SLS	FUSRAP responsibility transferred from the DOE to the USACE	Oct.13, 1997
North County	SLAPS VP: VP-56 removal action completed	1998
North County	The SLAPS: Construction of a loadout facility and a 1,200-foot (ft) rail spur	1998
SLDS	The *Record of Decision for the St. Louis Downtown Site* (SLDS ROD) was signed by the U.S. Army Director of Civil Works and by the Regional Administrator of the USEPA, Region 7 (USACE 1998a)	Aug. 1998
SLDS	The USACE commenced field operations at the SLDS	Sept. 8, 1998
North County	The USACE issued *Engineering Evaluation/Cost Analysis (EE/CA) for the Hazelwood Interim Storage Site (HISS)*, Final (HISS EE/CA) (USACE 1998b)	Oct. 1998
North County	SLAPS VPs: St. Denis Street Bridge replacement support, Florissant, Missouri	1998
North County	The SLAPS: North Ditch Removal Action and Sedimentation Basin Installation	1998 – 1999
North County	Latty Avenue Properties: Rail spur constructed at the HISS	1998 – 1999
SLDS	City Property VP (DT-2): remedial action initiated and completed in the central and southern portions of DT-2 located west of the levee	1998 – 1999
SLDS	Mallinckrodt Plant 2: remedial action initiated and completed[a]	1998 – 2000
North County	The USACE issued *Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum*, Final (SLAPS EE/CA and Action Memorandum) (USACE 1999a)	March 1999
North County	The SLAPS: East End, East End Extension and Right-of-Way (ROW) Work Areas – removal action initiated and completed	1999 – 2001
North County	SLAPS VPs: Removal action conducted in the North Ditch area between McDonnell Boulevard and the former Ballfield area	1999
North County	The SLAPS: East End and ROW Work Areas – removal action initiated and completed	1999 – 2001
SLDS	Current *Remedial Action Work Plan, FUSRAP St. Louis Downtown Site, St. Louis, Missouri*, Rev. 1 (IT 1999), issued	Dec. 1999
North County	The SLAPS: *Site Wide Removal Action Work Plan, FUSRAP St. Louis Airport Site, St. Louis, Missouri*, Rev. 0 Addendum 1 (Stone & Webster 2000), issued	March 2000
North County	The SLAPS: Radium Pits Work Area removal action initiated and completed	2000
North County	SLAPS VP: VP-38 removal action initiated and partially completed	2000
North County	Latty Avenue Properties: the HISS and Futura stockpiled material removed and shipped out of state to disposal facilities	2000 – 2001
SLDS	Mallinckrodt Plant 1: remedial action initiated and completed	2000 – 2003
SLDS	Mallinckrodt Plant 6E: remedial action initiated and completed	2000 – 2002
SLDS	Mallinckrodt Plant 6 East Half (EH): remedial action initiated and ongoing	2000-2013
North County	Latty Avenue Properties: VP-02(L) Building Roof remediation initiated and completed	2001 - 2002
SLDS	Midwest Waste VP (DT-7): remedial action initiated and completed	2001 – 2003
North County	SLAPS VP: VP-24 removal action initiated and completed	May 2002
North County	The SLAPS: Phase 1 Work Area – removal action initiated and completed	2001 – 2003
North County	The SLAPS: Phases 2 and 3 Work Area – removal action initiated and completed	2002 – 2005
SLDS	Heintz Steel and Manufacturing VP (DT-6): remedial action initiated and completed[b]	2003 – 2004
North County	*Feasibility Study for the St. Louis North County Site* (NC FS) (USACE 2003a) and *Proposed Plan for the St. Louis North County Site* (NC PP) (USACE 2003b) issued	May 2003
SLDS	*Phase 1 Ground-Water Remedial Action Alternative Assessment (GRAAA) at SLDS* (USACE 2003c) issued	June 2003

Table II-1. Chronology of Site Events (Continued)

Site	Event	Date
SLDS	Thomas and Proetz Lumber Company VP (DT-10): remedial action initiated and completed	2003 – 2006
SLDS	Mallinckrodt Plant 7 East (7E): remedial action initiated and completed	July – Sept. 2003
SLDS	City of Venice, Illinois, VP (DT-11): remedial action initiated and completed	2003 – 2004
North County	The SLAPS: Phase 5 Work Area removal action initiated and completed	2003 – 2005
North County	SLAPS VP: VP-10 removal action conducted	Oct. – Nov. 2003
North County	The SLAPS: Phase 6 (engineering evaluation/cost analysis [EE/CA]) Work Area removal action initiated and completed	2004 – 2005
North County	The SLAPS: Phase 4 Work Area removal action initiated and completed	2004
SLDS	Mallinckrodt Plant 6 West Half (WH): remedial action initiated and in progress	2004 - 2013
North County	SLAPS VP: VP-13 removal action conducted	June – July 2004
North County	SLAPS VPs: VP-04(C) and VP-05(C) removal action conducted	2004
SLS	Signature date of the Initial Five-Year Review Report (USACE 2004a)	September 28, 2004
SLDS	Midtown Garage VP (DT-29): remedial action initiated and completed	Oct. 2004
SLDS	Mallinckrodt Plant 7 North (7N): remedial action initiated and completed	2005, 2010 – 2011
SLDS	Mallinckrodt Plant 7 South (7S): remedial action initiated and completed	2005 – 2007, 2010
SLDS	*Memorandum for Record: Non-Significant Change to the Record of Decision for the St. Louis Downtown Site* issued (USACE 2005b)	March 2005
North County	NC ROD (USACE 2005a) signed by the Commander of the Mississippi Valley Division, the USACE; and by the Director of the Superfund Division, USEPA Region 7	Aug. 3 and Sept. 2, 2005
North County	SLAPS removal action (EE/CA) completed	Sept. 2005
North County	The SLAPS: Phase 6 (NC ROD) Work Area remedial action initiated and completed	2005 – 2007
SLDS	Gunther Salt VP (DT-4): remedial action initiated and completed[c.]	2006 – 2007
SLDS	Mallinckrodt Plant 9 and Security Gate Number 49 Area: remedial action initiated and completed	July – Aug. 2006
SLDS	PSC Metals, Inc. VP (DT-8): remedial action initiated and completed	2006 – 2008
North County	Current *FUSRAP Remedial Action Work Plan for the North St. Louis County Sites*, Rev. 0 (USACE 2006a)	Nov. 2006
North County	Latty Avenue Properties: VP-01(L) and Parcel 10K530087 remedial action initiated and completed, with the exception of the interior of buildings at VP-01(L)	2007 – 2008
North County	Latty Avenue Properties: VP-40A East remedial action initiated and partially completed	2007 – 2011
North County	SLAPS VP: VP-08(C) remedial action conducted. Remediation at VP-08(C) is in progress	June – Oct. 2007
SLDS	Christiana Court VP (DT-17): remedial action initiated and completed	August 2007
North County	SLAPS VP: IA-12 remedial action initiated and completed	2007 – 2008
SLDS	Norfolk Southern Railroad VP (DT-3): remedial action initiated and completed	Oct. – Nov. 2007
North County	Latty Avenue Properties: HISS/Futura remedial action initiated and completed	2008 – 2013
North County	SLAPS VP: IA-13 remedial action initiated and completed	June – Sept 2008
North County	Latty Avenue Properties: VP-04(L) and VP-05(L) remedial action initiated and completed	Feb. – March 2008
North County	SLAPS VPs: VP-08 and VP-09 remedial action initiated and completed	June 2008
SLDS	Terminal Railroad Association (TRRA) Soil Spoils Area: remedial action initiated and completed	Aug. – Sept. 2008

Table II-1. Chronology of Site Events (Continued)

Site	Event	Date
North County	SLAPS VP: VP-38 remedial action initiated and partially completed	February 2009
SLDS	TRRA VP (DT-9): remedial action initiated and completed	Feb – June 2009
North County	Hazelwood Avenue, Hazelwood Avenue ROW, and SLAPS VPs along Hazelwood Avenue (VPs 32, 35, 35A, 36, 39, 40, 42, and 47): remedial action initiated and completed	2009 – 2010
SLDS	City Property VP (DT-2): remedial action initiated and completed in the Phase I portion of DT-2 located west of the levee	2009 – 2012
North County	Latty Avenue Properties: VP-02(L) remedial action initiated and completed	2009 – 2011
North County	SLAPS VP: VP-54 remedial action initiated and completed	March – June 2010
North County	SLAPS VP: VP-63 remedial action initiated and completed	March – June 2010
North County	SLAPS VP: VP-55 remedial action initiated and completed	April – July 2010
North County	SLAPS VP: VP-53 remedial action initiated and completed	April – Aug. 2010
North County	SLAPS VPs: VP-05 and VP-06 remedial action initiated and completed	May – Aug. 2010
North County	SLAPS VP: VP-12 remedial action initiated and completed	2010 – 2011
SLDS	Burlington Northern Santa Fe (BNSF) Railroad VP (DT-12): remedial action initiated and completed	2010 – 2011
North County	SLAPS VP: McDonnell Boulevard East Section (b) ROW remedial action initiated and completed	2010 – 2011
SLS	Signature date of the Second Five-Year Review Report (USACE 2010a)	September 28, 2010
SLDS	Kiesel Riverfront Property: remedial action initiated and completed	Jan. – March 2011
North County	SLAPS VP: VP-31A remedial action initiated and completed	Feb. – May 2011
SLDS	City Property VP (DT-2): remedial action initiated and in progress in the Phase 2 portion of DT-2 located east of the levee	2011 – 2013
SLDS	Mallinckrodt Plant 7 West (7W): Initiated and completed excavation of contaminated soils beneath and adjacent to the 700 Pad and a rail spur[d]	2011–2012
North County	SLAPS VP: Ballfields VP (IA-09): Phase I remedial action initiated and completed	2011 – 2012
SLDS	Mallinckrodt Plant 6WH: Initiated and completed demolition of Building 101	2012
North County	SLAPS VP: Ballfields VP (IA-09): Phase 2 remedial action initiated and in progress	2012 – 2013
North County	SLAPS VP: VP-16 remedial action initiated and completed	2013
SLDS	Mallinckrodt Plant 6WH and Plant 6EH: remedial action beneath Building 101 initiated and in progress	2012-2013
SLDS	Kiesel Hall Street Property: remedial action initiated and in progress	2013
North County	SLAPS VP: Ballfields VP (IA-09): Phase 2B remedial action initiated and in progress	2013
North County	Latty Avenue Properties: VP-01(L) interior of buildings remedial action initiated and completed	March – August 2013
North County	SLAPS VP: Banshee Road remedial action initiated and completed	Sept. – Oct. 2013

[a] Additional remedial activities were conducted at Plant 2 in calendar year (CY) 2011 in order to address contamination in a formerly inaccessible area located north of the main excavation. Additional remediation activities are planned.

[b] Additional remedial activities were conducted at DT-6 in CY 2009 in order to address contamination associated with the storage building.

[c] Additional excavation was conducted along the eastern edge of Gunther Salt South (GSS), adjacent to DT-12, in CY 2010.

[d] Additional remedial activities are planned for Plant 7W.

III. BACKGROUND

Background information on each of the SLS is presented herein by site. The locations of the SLS in relation to each other and the City of St. Louis are shown on Figure III-1.

ST. LOUIS DOWNTOWN SITE

The Mallinckrodt LLC (Mallinckrodt) plants and vicinity properties (VPs) that comprise the SLDS are shown on Figure III-2 and are listed in Table III-1. The SLDS VPs consist of 37 numbered properties and two unnumbered properties that have potential contamination as a result of the historic Manhattan Engineer District (MED)/Atomic Energy Commission (AEC) operations at the Mallinckrodt Property and/or subsequent transportation, storage, or migration of MED/AEC-related residues. The VPs are identified using the prefix of "DT" to represent the "downtown" site and are followed by a number for consistent identification regardless of changing property ownership (e.g., DT-1). It should be noted that as new data were obtained and new civil land survey information became available during the ongoing pre-design investigation (PDI) efforts, the size, designation, and number of VPs has increased subsequent to signature of the *Record of Decision for the St. Louis Downtown Site* (SLDS ROD) (USACE 1998a). In March 2005, USACE issued a *Memorandum for Record: Non-Significant Change to the Record of Decision for the St. Louis Downtown Site* (USACE 2005b). The memorandum clarified and amended the boundaries of the SLDS to include additional areas to the north, south, and west of the site. The property boundaries shown on Figure III-2 reflect the current understanding of the SLDS property boundaries.

Table III-1. SLDS Properties

Property	ID	City Block/Tract Number and/or Address
Mallinckrodt (Mallinckrodt Property)	N/A	Multiple
Kiesel (formerly Archer Daniels Midland [ADM] and PVO Foods)	DT-1	2543; 2544
City Property VP	DT-2	Multiple
Norfolk Southern Railroad VP	DT-3	1198; 1200; 1201
Gunther Salt VP GSS Gunther Salt North (GSN)	DT-4	1198-E; 101 Buchanan Street
AmerenUE	DT-5	660-W
Heintz Steel and Manufacturing VP	DT-6	2541; 2542; 3300 Hall Street
Midwest Waste VP	DT-7	2543
PSC Metals, Inc. (formerly McKinley Iron) VP	DT-8	Multiple; 3620 Hall Street
TRRA VP	DT-9	2520
Thomas and Proetz Lumber Company VP	DT-10	2540; 3400 Hall Street
City of Venice, Illinois (formerly McKinley Bridge), VP (currently owned by the Illinois Department of Transportation and the Missouri Department of Transportation [MoDOT])	DT-11	2536; 2540; 2541
BNSF Railroad VP	DT-12	2526; 2540; 2541
Cash's Scrap Metal	DT-13	308-W; 201-205 Dock
Cotto-Waxo Company	DT-14	1197; 3301 - 3327 N. Second Street
Metropolitan St. Louis Sewer District (MSD) Lift Station	DT-15	2536; 2526; 3525 N. Wharf and 1 E. Salisbury
Star Bedding Company	DT-16	308-W; 3228 N. Broadway
Christiana Court, LLC VP	DT-17	308-W; 3240 N. Broadway

Table III-1. SLDS Properties (Continued)

Property	ID	City Block/Tract Number and/or Address
Curley Collins Recycling (currently owned by the City of St. Louis)	DT-18	308-E; 121 Dock
City of St. Louis Streets	DT-19	Multiple
Richey	DT-20	1196; 3301 N. Broadway
Favre	DT-21	1196; 3319 N. Broadway
Tobin Electric	DT-22	1196; 3321 N. Broadway
InterChem	DT-23	1205; 3501 N. Broadway
Bremen Bank	DT-24	1205; 3529 N. Broadway
Eirten's Parlors (aka O.T. Hodges)	DT-25	1205; 3500 N. 9th
United Auto Workers Local 1887	DT-26	1214; 3607 N. Broadway
Dillon	DT-27	1217; 3707 - 9 N. Broadway
Challenge Enterprise	DT-28	2545; 816 Buchanan
Midtown Garage VP	DT-29	2545; 309-W; 3227 N. Broadway
Zamzow Manufacturing	DT-30	2545; 3234 N. 9th
Porter Poultry	DT-31	309-W; 3123 N. Broadway
Westerheide Tobacco Store (purchased by Mallinckrodt)	DT-32	1213
MoDOT	DT-33	1204/1215
Hjersted	DT-34	2526; 10 Bremen
Commercial Wholesale Tire Distribution Company	DT-35	1932; 3812 N. Broadway
OJM, Inc.	DT-36	1217 and 1931; 3801 - 3903 N Broadway
Lange-Stegmann	DT-37	2520; 11 Bremen
TRRA Soil Spoils Area	N/A	664-W; 50 Branch; 2901 Hall; 3001 Hall; 21-99 North Market.
Kiesel Hall Street Property[a]	N/A	661-E; 3130 Hall, 13 Branch
Kiesel Riverfront Property[b]	N/A	2541; 3301 N. Wharf

[a] Includes portions of the adjacent Gunther Salt and St. Louis City VPs.

[b] Includes a portion of the City of St. Louis VP.

Note:

N/A = Not Applicable

The final remedial action selected for the SLDS Accessible Soil and Ground-Water OU contaminated as the result of MED/AEC uranium manufacturing and processing activities at the SLDS is discussed in detail in the SLDS ROD. Hazardous wastes resulting from releases on the site during the Mallinckrodt operations for the MED/AEC are the subject of the remedial action at the SLDS. The SLDS has been separated into two OUs: (1) the SLDS Accessible Soil and Ground-Water OU and (2) the SLDS ISOU. The SLDS Accessible Soil and Ground-Water OU consists of the accessible soil and ground water contaminated as the result of MED/AEC uranium processing activities at the Mallinckrodt plant. As defined in the *Remedial Investigation and Baseline Risk Assessment Report for the Inaccessible Soil Operable Unit at the St. Louis Downtown Site* (SLDS ISOU RI/BRA Report) (USACE 2012a), the ISOU media include the following:

- Soil that is inaccessible due to the presence of buildings and other permanent structures, including the supporting subsoil within the footprint of a structure of which remediation would reasonably be expected to affect the stability of the structure.
- Soil located under active railroads, including the supporting soil in the associated right-of-way (ROW).

- Soil located under roadways, including the supporting soil in the associated ROW. Roadways are defined as the public and private streets. Inaccessible soil does not include soil beneath driveways, parking lots, or other paved surfaces that were addressed as accessible soil areas.
- Soil on the exteriors and interiors of buildings and permanent structures (e.g., tanks, bridges, sheds, loading docks, utility poles, traffic signals, piping, rail tracks, and equipment boxes).
- Sewers (e.g., structures and interior sediment) not directly encountered within an excavation area during the remedial action conducted under the SLDS ROD.
- Soil adjacent to sewers located beneath buildings, permanent structures, railroads, and/or roads.

The ISOU was excluded from the scope of the SLDS ROD (USACE 1998a) because the inaccessible soil did not present a significant threat in its current configuration and because activities critical to the continued operation of Mallinckrodt prevented excavation beneath the encumbrances (e.g., roads, active railroads, buildings, and other permanent structures). Because land use has remained the same on the Mallinckrodt Property and VPs since the SLDS ROD (USACE 1998a) was signed, these determinations hold true today. As stated previously, this five-year review report addresses only the SLDS Accessible Soil and Ground-Water OU. The SLDS ISOU is outside the scope of this five-year review.

SLDS Physical Characteristics

The SLDS comprises a 182,108-square meter (m^2) (45-acre) chemical manufacturing complex owned by Mallinckrodt and 39 adjacent VPs located in an industrialized area approximately 2 miles north of the St. Louis downtown area (see Figure III-2). The SLDS is situated within the floodplain adjacent to the western bank of the Mississippi River and is separated from the river by the St. Louis Flood Protection system (a combination of man-made levees and floodwall structures). The local topography of the site is generally flat. Surface drainage is directed through ditches and catchment basins into an extensive storm drainage system that discharges to a nearby sewage treatment plant. Extensive industrial and commercial development has largely obliterated the upper portion of the native soil column. Fill was placed on top of the original floodplain as the area was being developed. A generalized stratigraphic column for the SLDS is shown on Figure III-3.

Ground water at the SLDS is found within the following three hydrostratigraphic units (HUs):

- HU-A, the upper unit that consists of fill material on top of naturally deposited clays and silts;
- HU-B, the lower unit referred to as the Mississippi Alluvial Aquifer, which consists of naturally deposited alluvium; and
- HU-C, limestone bedrock.

As shown in the geologic cross-section of the SLDS (Figure III-4), the erosional surface of the bedrock dips eastward toward the river. HU-A overlies HU-B on the eastern side of the SLDS and overlies bedrock on the western side of the SLDS. HU-B thins westerly along the bedrock surface until it becomes absent beneath the SLDS. HU-C underlies the unconsolidated sediments at depths ranging from 19 ft (6 m) on the western side of SLDS to 80 ft (24 m) near the Mississippi River.

SLDS Land and Resource Use

The SLDS comprises a large chemical manufacturing complex owned and operated by Mallinckrodt and adjacent commercial and city-owned VPs. The VPs encompass more than 667,731 m^2 (165 acres) of land surrounding the 182,108-m^2 (45-acre) Mallinckrodt Property. Mallinckrodt has used the property for chemical manufacturing and related operations since 1867. Mallinckrodt currently maintains 24-hour security at the property and limits site access to employees, subcontract employees, and authorized visitors. The Mallinckrodt Property is enclosed by a well-maintained and patrolled security fence.

The land usages and physical features at the VPs are varied and include active businesses (e.g., lumber yard, metal salvage, and steel fabrication), inactive/abandoned businesses (e.g., the Kiesel VP [DT-1]), railroad lines, bridge structures (the McKinley Bridge), and a portion of the earthen levee and concrete floodwall that protects the St. Louis area from Mississippi River floodwaters. The SLDS has been used as an industrial area for significantly more than a century. The SLDS is currently zoned industrial, which does not allow for the construction or renovation of buildings for residential purposes. The long-term plans for the SLDS area are to retain the industrial uses; encourage the wholesale produce district; and phase out the remaining, marginal residential uses.

HU-A is not an aquifer and is not considered a potential source of drinking water because it has insufficient yield, poor natural water quality, and susceptibility to surface-water contaminants due to the industrial setting of the SLDS. The Mississippi Alluvial Aquifer (HU-B) is a principal aquifer in the St. Louis area, including the SLDS. Aquifers in this area also exist in the bedrock formations underlying the alluvial deposits. Ground-water aquifers in the St. Louis area are often mineralized (resulting in poor quality) and do not meet drinking-water standards without treatment. HU-B is currently not used as a source of drinking water. The future use of HU-B as a drinking-water source at the SLDS is expected to be minimal for several reasons: the Mississippi and Missouri rivers provide a readily available source of drinking water; the SLDS is located in an industrial setting; and the SLDS is bordered to the east by the Mississippi River. HU-C would be an unlikely water supply source, as it is a deeper and a less productive HU. The expected future use of ground water at the SLDS is not expected to change from current use.

History of Contamination at the SLDS

Mallinckrodt was contracted by the MED/AEC from 1942 to 1957 to process uranium ore for the production of uranium metal. From 1942 to 1945, Plants 1, 2, and 4 (where Plant 10 is now located) were involved in the development of uranium-processing techniques, uranium compounds and metal production, and uranium metal recovery from residues and scrap.

Plant 6 produced uranium dioxide from pitchblende ore starting in 1946. During 1950 and 1951, Plant 4 was modified and used as a metallurgical pilot plant for processing uranium metal. Plant 4 continued to operate until 1956, when it was closed and operations began at Plants 6 and 7. MED/AEC operations in Plant 6 ended in 1957. Residuals of the process, including spent pitchblende ore, process chemicals, and radium, thorium, and uranium, were inadvertently released from the Mallinckrodt Property and into the environment through handling and disposal practices.

The radiological contamination in soil on the VPs may be attributed to inadvertent releases of radionuclides to the environment during the MED/AEC uranium processing operations or operations unique to the VP itself (e.g., various types of naturally occurring radioactive materials (NORM) were handled and stored on some VPs). Buildings and/or other structures on the VPs

may also have been affected by the inadvertent release of radionuclides during the MED/AEC operations. The AEC managed decontamination efforts (removal and offsite disposal of radiologically contaminated buildings, equipment, and soil) in Plants 4, 7, and 6 to meet AEC criteria and returned the plants to Mallinckrodt in 1962 for use without radiological restrictions.

A radiological survey conducted at the SLDS in 1977 found radiological contamination that exceeded existing guidelines. Elevated gamma radiation levels were measured at outdoor locations and within some of the historical processing buildings. Additionally, radium (Ra)-226 and uranium (U)-238 concentrations in certain soil samples significantly exceeded background concentrations. In response to this survey, it was determined that further investigation of the site was necessary to characterize the nature and extent of the contamination. In 1990, the USEPA Region 7 and the U.S. Department of Energy (DOE) established schedules and deliverables for the CERCLA process at the SLS. In 1994, the DOE submitted the *Remedial Investigation Report for the St. Louis Site* (SLS RI Report) (DOE 1994).

SLDS Interim Actions

Four interim actions were performed by the DOE at the SLDS prior to signing of the SLDS ROD. The first interim action consisted of the decontamination, demolition, and crushing of the 50-Series Buildings (Buildings 50, 51, 51A, 52, and 52A). In this action, 1,000 cubic yards (yd^3) (765 cubic meters [m^3]) of contaminated material were shipped offsite, and 1,000 yd^3 (765 m^3) of crushed concrete (crushate) were generated. In the second interim action, asbestos abatement, decontamination, demolition to floor elevation, grading, and crushing operations were conducted at Plants 6 and 7 (Buildings 100, 116, 116B, 117, 700, 704, 705, 706, 707, and 708). In this interim action, 2,673 yd^3 (2,044 m^3) of contaminated material were shipped offsite and 7,000 yd^3 (5,352 m^3) of crushate were generated. The third interim action consisted of contaminated soil excavation in Plant 4 (currently Plant 10). A total of 15,043 yd^3 (11,501 m^3) of contaminated material were shipped offsite. In the fourth interim action, 750 yd^3 (573 m^3) of contaminated material were excavated from the St. Louis Riverfront Trail area and shipped offsite.

SLDS Basis for Taking Action

Characterization activities at the SLDS have determined that contamination related to MED/AEC activities is present in the accessible surface and subsurface soil of the Mallinckrodt plant and VPs at levels that require remedial action. The contamination detected likely resulted from both MED/AEC activities. In addition, other contaminants have likely leached from the coal slag and cinders used as fill in the area. All wastes resulting from or associated with uranium manufacturing or processing activities conducted at the SLDS for the MED/AEC are the subject of the remedial action selected in the SLDS ROD (USACE 1998a). Other chemical or non-radiological wastes that are mixed or commingled with radiologically contaminated wastes resulting from or associated with MED/AEC uranium manufacturing or processing activities conducted at the SLDS are also subject to this remedial action. Contaminants that are not associated with MED/AEC uranium manufacturing or processing activities conducted at the SLDS are being addressed through actions being carried out by other authorities. The other actions being carried out include termination of a Mallinckrodt U.S. Nuclear Regulatory Commission (NRC) license for Plant 5 and a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for the entire Mallinckrodt facility.

Radiological and non-radiological contamination related to MED/AEC activities is present in accessible soil and ground water at the SLDS. The USACE determined, based on the results of the baseline risk assessment, that a remedial action was required at the SLDS, because the

contamination poses a current or potential threat to human health or the environment. Contaminants include arsenic, cadmium, and radionuclides in the uranium, thorium, and actinium series. Potential exposure pathways include direct contact with soil through ingestion and dermal contact, external gamma radiation from soil, inhalation of fugitive dust and radon gas emissions from soil, and ingestion of ground water. Risk from ingestion of ground water has been eliminated. City of St. Louis Ordinance 66777 explicitly forbids the installation of wells into the subsurface for the purpose of using the ground water as a potable water supply (City of St. Louis 2005). Ground water is of poor quality, yields in the bedrock are poor, and the area has abundant surface water, which makes future ground-water use unlikely.

NORTH ST. LOUIS COUNTY SITES

The North St. Louis County Sites are located in St. Louis County, Missouri, throughout an area immediately north of Lambert – St. Louis International Airport and approximately 11 miles northwest of the SLDS. The general location of the North St. Louis County Sites is shown on Figure III-1. The North St. Louis County Sites are composed of the following properties:

- the SLAPS;
- the SLAPS VPs, which include Coldwater Creek (CWC) and approximately 78 properties near the SLAPS and properties along CWC; and
- the Latty Avenue Properties, which include the HISS, Futura, and eight VPs.

These properties are located within the City of Hazelwood and the City of Berkeley, and include the airport property owned by the City of St. Louis. The SLAPS VPs consist of the properties between the SLAPS and the HISS, along CWC, and the open fields immediately north of the SLAPS (the former Ballfields area). The Latty Avenue Properties include the HISS, Futura, and the Latty Avenue VPs 01(L) through 06(L) and 40A (partial), and Parcel 10K530087. The individual VPs are shown on Figures III-5 and III-6 and are listed in Tables III-2, III-3, and III-4. The VPs are listed according to their associated USACE property designation number (e.g., VP-24).

Table III-2. North St. Louis County Sites Properties – SLAPS VPs

Site Location	VP Number	County Locator Number and Address
SLAPS VPs	01	10L220921 and 10L220912 5800 and 5862 N. Lindbergh Boulevard Hazelwood, Missouri
SLAPS VPs	02	10L240143, 10L240152, 10L330150, 10L240161, and 10L330161 5896 N. Lindbergh Boulevard and 280, 150, 158, and 140 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	03	10L330123 5900 N. Lindbergh Boulevard Hazelwood, Missouri
SLAPS VPs	04 and 05	10L330114 183 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	06	10L330040 163 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	07	10L330031 153 McDonnell Boulevard Hazelwood, Missouri

Table III-2. North St. Louis County Sites Properties – SLAPS VPs (Continued)

Site Location	VP Number	County Locator Number and Address
SLAPS VPs	N/A	11L630022
SLAPS VPs	08	10L330022 143 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	09	10L330073 141 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	10 and 11	10L340151 133 McDonnell Boulevard Hazelwood, Missouri 63042
SLAPS VPs	12	10L340142 123 McDonnell Boulevard Hazelwood, Missouri
SLAPS VPs	13	10L310031 5290 Banshee Road Hazelwood, Missouri
SLAPS VPs	N/A	Lambert – St. Louis International Airport Wells
SLAPS VPs	N/A	Lambert – St. Louis International Airport, NE Corner of Airport Airfield
SLAPS VPs	N/A (St. Louis Co. Department of Highways and Traffic)	McDonnell Boulevard from Lindbergh to ~2,500 ft (~762 m) south of Banshee
SLAPS VPs	N/A	Railway ROW in and around the SLAPS, the Latty/HISS, and the SLAPS VPs and County Parcel ID No. 10K520143
SLAPS VPs	14	11K510035 6367 McDonnell Boulevard Berkeley, Missouri 63042
SLAPS VPs	15	11K520056 8905 Airport Road Berkeley, Missouri 63134
SLAPS VPs	Ballfields	10K110021 and 10K130014 McDonnell Boulevard and Eva Avenue
SLAPS VPs	16	10K210064 6685 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	17	10K210053 6709 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	18	10K230051 6745 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	19	10K230031 9080 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	20A	No parcel number 9060 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	20	10K230040 9040 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	21	10K230073 9043 Frost Avenue Berkeley, Missouri 63134

Table III-2. North St. Louis County Sites Properties – SLAPS VPs (Continued)

Site Location	VP Number	County Locator Number and Address
SLAPS VPs	22	10K240106 9015 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	23	10K240094 8921 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	24	10K330360, 10K240225, and 10K240216 8801, 8875, and 8893 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	25	10K210031 and 10K220195 8900 and 9060 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	26	10K240207 and 10K220184 8870 Frost Avenue and 6745 Romiss Ct Berkeley, Missouri 63134
SLAPS VPs	27	10K330030 8854 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	28	10K330351 8838 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	29	10K330223 8822 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	30	10K330232 8810 Frost Avenue Berkeley, Missouri 63134
SLAPS VPs	31 (MoDOT)	Locator Number not available. SE Corner Jonas Place and Frost Berkeley, Missouri 63134
SLAPS VPs	31A	10K330342 and 10K330250 6822 and 6824 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	32	10K330241 8801 Seeger Ind. Drive Berkeley, Missouri 63134
SLAPS VPs	33	10K330333 6826 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	34	10K330324 6830 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	35 and 35A	10K610178 6850 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	36	10K520198 and 10K520202 6821 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	37	10K520066 6891 Hazelwood Avenue Berkeley, Missouri 63134
SLAPS VPs	38	10K540097 7101 Hazelwood Avenue Berkeley, Missouri 63042

Table III-2. North St. Louis County Sites Properties – SLAPS VPs (Continued)

Site Location	VP Number	County Locator Number and Address
SLAPS VPs	39	10K630363 7100 Hazelwood Avenue Berkeley, Missouri 63042
SLAPS VPs	40	09K220140 7275 Hazelwood Avenue Hazelwood, Missouri 63042
SLAPS VPs	41	10K540031 8827 Nyflot St. Louis, Missouri 63140
SLAPS VPs	42	09K220041 7301 Hazelwood Avenue Hazelwood, MO 63042
SLAPS VPs	43	10K540075 8834 Heather Lane, Suite A Hazelwood, Missouri 63042
SLAPS VPs	44	09K220030 8841 Heather Lane Hazelwood, Missouri 63042
SLAPS VPs	45	09K220216 (part of) 8864 Hazelwood Tech Court Hazelwood, Missouri 63042
SLAPS VPs	46	09K220074 7314 Hazelwood Avenue Hazelwood, Missouri 63042
SLAPS VPs	47	09K220085 7351 Hazelwood Avenue Hazelwood, Missouri 63042
SLAPS VPs	48 and 48A	09K220315 and 09K220326 7320 and 7328 Hazelwood Avenue Hazelwood, Missouri 63042
SLAPS VPs	49	09K310207 (part of) 8800 Hazelwood Tech Court Hazelwood, Missouri 63042
SLAPS VPs	50 and 51	09K310197 8784 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	52	09K324497 and 09K3244868780 8700 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	53	09K220162 8830 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	54	09K220205 8840 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	55	09K210217 and 09K210228 8900 and 8880 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	56	09K210239, 09K230161, 09K230172, and 09K230183 8950, 8970, 8940, and 8930 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	57	09K140026 9044 Pershall Road Hazelwood, Missouri 63042

Table III-2. North St. Louis County Sites Properties – SLAPS VPs (Continued)

Site Location	VP Number	County Locator Number and Address
SLAPS VPs	58	09K140015 9050 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	59	09K110304 9124 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	N/A (MoDOT)	Location number not available. Pershall Road from east of Lindbergh Boulevard to just west of Hazelwood Avenue
SLAPS VPs	60 and 61	09K130115 9144 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	62	09K130038 9150 Pershall Road Hazelwood, Missouri 63042
SLAPS VPs	63	10K430053, 10K420043, and 10K420054 6250, 6252, and 6248 N. Lindbergh Boulevard Hazelwood, Missouri 63042
SLAPS VPs	VP Number not assigned (City of Florissant)	County Bridge No. 14650211

Note:

In addition to the properties listed in this table, additional properties for which VP numbers were not assigned (i.e., parcels associated with Ford Lane, Seeger Industrial Drive, Polson Lane, Romiss Court, Jonas Place, Heather Lane, I-170 ROW, and Byassee Drive) are included in the SLAPS VPs.

Table III-3. North St. Louis County Sites Properties – SLAPS VPs: CWC

Site Location	VP Number	County Locator Number and Address
CWC	01(C)	09K210064 8950 Pershall Road Hazelwood, Missouri 63042
CWC	02(C)	N/A (Norfolk Southern Railroad)
CWC	03(C)	09K120040 7225 Polson Lane Hazelwood, MO 63042
CWC	04(C)	09K120127 95 Ford Lane Hazelwood, MO 63042
CWC	05(C)	09K120116 93 Ford Lane Hazelwood, MO 63042
CWC	06(C)	10K440113 and 10K440104 7203 and 7201 Polson Lane Hazelwood, MO 63042
CWC	07(C)	10K440096 7207 Polson Lane Hazelwood, MO 63042
CWC	08(C)	10K440074 7213 Polson Lane Hazelwood, MO 63042
CWC	09(C) and 10(C)	10K420032 105 Byassee Drive Hazelwood, MO 63042
CWC	VP Number Not Assigned	07J520900

Table III-4. North St. Louis County Site Properties – Latty Avenue Properties

Site Location	VP Number	County Locator Number and Address
Latty Avenue VP	01(L)	10K530098 9151 Latty Avenue Berkeley, Missouri 63134
Latty Avenue VP	Parcel 10K530087	10K530087 9205 Latty Avenue, Berkeley Berkeley, Missouri 63134
Latty Avenue VP	02(L)	10K510012 9150 Latty Avenue Hazelwood, Missouri 63134
Latty Avenue VP	03(L)	10K520022 9060 Latty Avenue Berkeley, Missouri 63134
Latty Avenue VP	04(L)	10K520220 8966 Latty Avenue Berkeley, Missouri 63134
Latty Avenue VP	05(L)	10K520211 8942 Latty Avenue Berkeley, Missouri 63134
Latty Avenue VP	06(L)	10K510067 8999 Seeger Ind. Drive Berkeley, Missouri 63134
Latty Avenue VP	40A (Partial)	10L340041
HISS/Futura	Futura	10K510023 9200 Latty Avenue Berkeley, Missouri 63134
HISS/Futura	HISS	10K510090 9170 Latty Avenue Berkeley, Missouri 63134

North St. Louis County Sites Physical Characteristics

The SLAPS covers 89,031 m^2 (22 acres) bounded by James S. McDonnell Boulevard (McDonnell Boulevard) to the north, CWC to the west, and Norfolk Southern Railroad tracks to the south. A 1,000-foot (ft)-long (305-meter [m]-long) railroad spur, constructed in 1998, parallels and connects to these tracks. The local topography of the SLAPS is relatively flat due to previous construction, demolition, and grading activities. The native soil has been largely disturbed or covered by fill during the previous activities. Surface drainage from the SLAPS is directed through four drainage ditches that ultimately discharge to CWC.

The local terrain of the remainder of the North St. Louis County Sites (i.e., Latty Avenue Properties and the SLAPS VPs) is generally flat with surface run-off toward CWC, either directly or via intermittent tributaries. CWC is the main drainage for the North St. Louis County Sites. Several areas along CWC commonly experience flash flooding during heavy rainfall events, as well as occasional major flooding during extreme precipitation events. Water quality in the creek is generally poor and has been affected by industrial discharges from multiple facilities, including storm-water run-off and discharges from three sewage treatment facilities and the Lambert – St. Louis International Airport.

A generalized stratigraphic column for the SLAPS and the HISS is shown on Figure III-7. As shown in the geologic cross-sections of the SLAPS and SLAPS VPs (Figures III-8 and III-9), surficial deposits (Unit 1) include topsoil and anthropogenic fill (rubble, scrap metal, gravel,

glass, slag, and concrete) generally less than 14 ft thick (4.3 m). Unit 2 is comprised of loess and has a thickness of 11 to 30 ft (3.4 to 9.1 m). Unit 3, which is subdivided into Subunits 3T, 3M, and 3B, consists primarily of clay and silt lakebed deposits. Each of these clayey subunits has a thickness of up to 30 ft (9.1 m). Unit 4 consists of clayey gravel with fine to very-fine sand and sandy gravel. This unit is interpreted to be approximately 5 to 15 ft (1.5 to 4.6 m) thick and thins eastward and westward of the SLAPS. This unit is absent beneath the eastern part of the SLAPS, where the 3T, 3M, and 3B drape, or onlap, onto shale bedrock. Below Units 3 and 4 are Units 5 and 6, which consist of Pennsylvanian shale/siltstone and Mississippian limestone, respectively. Depth to bedrock ranges from approximately 55 ft (16.8 m) on the eastern part of the SLAPS to a maximum of 90 ft (27.4 m) toward CWC to the west. The hydrogeologic and geologic setting at the SLAPS and SLAPS VPs is similar to that at the HISS, with one exception. The Pennsylvanian shale bedrock unit (Unit 5), present beneath portions of the SLAPS and SLAPS VPs, is absent beneath the HISS.

Five hydrostratigraphic zones (HZs) are present at the North St. Louis County Sites. The five HZs are identified in the conceptual model of ground-water flow for the SLAPS shown in Figure III-10. The shallow ground-water zone, HZ-A, consists of the five grained silts and clays of Unit 1, Unit 2, and Subunit 3T. Underlying HZ-A is HZ-B, consisting of clay (Subunit 3M), and HZ-C, consisting of silty clay, clayey silt, and clayey gravel deposits (Subunit 3B and Unit 4). Beneath these unconsolidated deposits are HZ-D, consisting of shale (Unit 5), and HZ-E, the limestone bedrock (Unit 6). HZ-E is the protected aquifer for the North St. Louis County Sites. All five HZs (HZ-A through HZ-E) occur beneath the SLAPS. However, HZ-D (shale) is not present beneath the HISS or Futura. A relatively impermeable clay aquitard (HZ-B) separates HZ-A from the remaining underlying HZs at the SLAPS and the HISS. The presence of this aquitard, along with available analytical data, indicates there is little to no hydraulic connection between ground water in HZ-A and the lower HZs at the SLAPS. This interpretation of negligible communication between HZ-A and the lower HZs is supported by anion and cation compositions of ground-water samples, differing piezometric surfaces, and tritium data. Additionally, the available ground-water monitoring data indicate localized effects on ground water in HZ-A and an absence of these effects in lower HZ ground water (USACE 2003a). The total dissolved solids values in HZ-A ground water, combined with poor water extraction rates due to low hydraulic conductivities (on the order of 10^{-6} to 10^{-8} centimeters [cm]/second), provide confirmation that HZ-A does not produce water in sufficient quantities to fit the definition of an aquifer or to serve as a drinking-water supply. Furthermore, the low yields of ground water in HZ-A neither contribute an important part of the base flow to CWC nor contribute to contaminant levels above water quality standards in creek surface water.

North St. Louis County Sites Land and Resource Use

Soil exceeding the NC ROD remediation goals (RGs) at the SLAPS has been removed and the excavations backfilled and covered with either recently established turf or temporary crushed stone surfacing. The response actions are completed on the site. Currently, some temporary buildings and other structures, including a railspur and loadout pad, are located at the SLAPS to facilitate remedial activities at other properties at the North St. Louis County Sites. The SLAPS loadout facility will be removed when it is no longer needed to support North County remedial activities. Once removed, the area underneath will undergo verification to confirm that the area still meets RGs. No permanent structures are located at the SLAPS.

Typical Latty Avenue Properties consist of commercial, industrial, and warehouse facilities, and buildings with adjoining paved and turfed areas. The HISS and Futura cover a 44,515-m^2

(11-acre) tract. Stockpiled material was removed from the HISS and shipped to an out-of-state disposal facility during the initial five-year review period. The Futura portion of the site consists of a manufacturing facility surrounded by paved and turfed areas. Remedial activities were initiated in calendar year (CY) 2007 at the HISS and Futura. Remedial actions were completed at the HISS and Futura in CY 2011 and CY 2013, respectively.

The SLAPS VPs consist of more than 78 properties between the SLAPS and the HISS, as well as railroad lines, the open field area immediately north of the SLAPS (the former Ballfields area), and CWC. Generally, the SLAPS VPs are used similarly to the Latty Avenue Properties. The former Ballfields area is covered with grass and is not used, except for one portion occupied by the City of Berkeley Shooting Range and Mulch Storage Area. CWC, from Lindbergh Boulevard to the Missouri River, is a Class C waterway (periodic no-flow conditions) designated for livestock and aquatic life use.

HZ-A is not an aquifer and is not considered a current or potential future source of drinking water because it has insufficient yield and has been affected by broad-scale human activity. HZ-B through HZ-D are not considered protected aquifers, but HZ-E is a protected aquifer at the North St. Louis County Sites. Given the proximity of the Missouri and Mississippi rivers and the availability of treated water, HZ-E is not used as a drinking-water source at the North St. Louis County Sites. The future use of ground water at the North St. Louis County Sites is not expected to change from current use.

North St. Louis County Sites History of Contamination

In 1946, the MED/AEC acquired the 89,031-m^2 (22-acre) tract of land now known as the SLAPS to store residues and scrap resulting from uranium processing at the SLDS. Several wastes and by-products were transported to the SLAPS for storage, including radium-bearing residues, raffinate cake, barium sulfate cake, and C-liner slag. The MED/AEC ultimately obtained title to the SLAPS by condemnation proceedings on January 3, 1947. By 1960, there were approximately 50,000 empty drums and 3,500 tons of contaminated steel and alloy scrap stored at the SLAPS.

Continental Mining and Milling Company of Chicago purchased uranium-bearing residues from the MED and removed them from the SLAPS in 1966. The company placed the residues in storage at a property on Latty Avenue (now known as the HISS and Futura) under an AEC license. In January 1967, the Commercial Discount Corporation of Chicago, Illinois, purchased the residues. Much of the material was dried and shipped to Canon City, Colorado. The material remaining at the Latty Avenue storage site was sold to Cotter Corporation in December 1969. From August through November 1970, Cotter Corporation dried some of the remaining residues and shipped them to its mill in Canon City. Over time, soils and sediments at the VPs were contaminated by residues originating from residue hauling activities or from water and wind erosion from other sites.

In 1979, the owner of the Futura property excavated approximately 13,000 yd^3 (9,939 m^3) of soil and debris from the western portion of the property prior to constructing a manufacturing facility. This excavated material was placed at the eastern end of the HISS in a storage pile, subsequently referred to as the Main Pile.

With regard to the Latty Avenue Properties, the DOE supported construction activities at Futura in 1984. These activities resulted in the generation of approximately 14,000 yd^3 (10,704 m^3) of contaminated soils that were added to the Main Pile at the HISS. In 1986, the DOE provided radiological support to the cities of Hazelwood and Berkeley for a drainage and road improvement project along Latty Avenue. This project generated another approximately 4,600 yd^3 (3,517 m^3) of

contaminated material that was placed in a storage pile at the HISS. This storage pile later became known as the Supplemental Pile.

North St. Louis County Sites Removal Actions

Several removal actions were performed by the DOE and the USACE at the North St. Louis County Sites prior to the signing of the NC ROD in September 2005. At the SLAPS, the first removal action was conducted by DOE in the spring of 1985. To mitigate gully erosion that had occurred in the western portion of the SLAPS along the bank of CWC, a gabion retaining wall was constructed along the bank.

In 1996, the owner of the property to the east of the HISS and Futura, General Investment Funds Real Estate Holding Company (GIFREHC), in consultation with the DOE, made commercial parking and drainage improvements on the property. These actions resulted in the creation of two contaminated soil piles on the southwest portion of the property, now referred to as VP-02(L). These piles were known as East Piles 1 and 2. A high-density polyethylene liner was placed over the material in both piles, followed by "clean" soil and a vegetative cover. In addition, two small piles, referred to as the HISS Railroad Spur Spoil Piles A and B (contaminated soil and debris), were generated during construction of the railroad spur on the HISS in early 1999. Spoil Pile A was located between the Main Pile and the Supplemental Pile (created as a result of a 1986 drainage and road improvement project along Latty Avenue) and Spoil Pile B was located south of the Main Pile. Spoil Piles A and B were covered with synthetic liners.

The USACE conducted a second removal action in the fall of 1997 to address contamination in an area immediately east of the gabion wall. Approximately 5,100 in situ yd^3 (3,899 m^3) of contaminated material were removed under this action and transported offsite pursuant to the *St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA)* (SLAPS Interim Action EE/CA) (DOE 1997a) and the *SLAPS Action Memorandum for the Removal of Radioactively Contaminated Material* (DOE 1997b).

Removal actions have also been conducted at several of the SLAPS VPs and other Latty Avenue VPs. In 1995, the DOE excavated contaminated soil from six residential SLAPS VPs and two industrial Latty Avenue VPs pursuant to the *Engineering Evaluation/Cost Analysis – Environmental Assessment for the Proposed Decontamination of Properties in the Vicinity of the Hazelwood Interim Storage Site, Hazelwood, Missouri* (HISS EA EE/CA) (DOE 1992), and the *St. Louis Site – Action Memorandum for Vicinity Property Cleanups* (DOE 1995a).

North St. Louis County Sites Basis for Taking Action

Characterization activities at the North St. Louis County Sites have determined that contamination related to MED/AEC activities is present in the surface and subsurface soil and requires remedial action. The contamination resulted from uncontrolled storage and subsequent transportation of MED/AEC-contaminated materials generated at the SLDS. As established, (1) All MED/AEC wastes, including but not limited to radiologically contaminated wastes, resulting from or associated with uranium manufacturing or processing activities conducted at the SLDS; and, (2) other chemical or non-radiological wastes which have been mixed or commingled with radiologically contaminated MED/AEC wastes resulting from or associated with uranium manufacturing or processing activities conducted at the SLDS are subject to the response actions conducted at the North St. Louis County Sites.

Radiological and metals contamination related to MED/AEC activities is present in environmental media at the site. The USACE determined, based on the results of the baseline risk assessment, that a remedial action was required at the North St. Louis County Sites, because the contamination poses a current or potential threat to human health or the environment. Affected media at the North St. Louis County Sites are soil, sediment, shallow ground water (HZ-A), surface water, and soils adhered to the surface of buildings and structures. Exposure pathways include dermal contact (non-radionuclides only), direct gamma (radionuclides only), soil/sediment ingestion, and dust inhalation. Ground water is not considered a complete exposure pathway because there are no contaminants in the potentially usable ground-water unit (HZ-E).

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IV. ST. LOUIS SITES REMEDIAL ACTIONS

SLS remedial actions consisted of a remedial action performed at a non-NPL site known as the SLDS (the Mallinckrodt Property and VPs) in accordance with the SLDS ROD (USACE 1998a) and a remedial action at the North St. Louis County Sites (the SLAPS, SLAPS VPs, and the Latty Avenue Properties [comprised of the HISS, Futura, and the Latty Avenue VPs]) performed in accordance with the NC ROD (USACE 2005a). Three of the North St. Louis County Sites properties (the SLAPS, the HISS, and Futura) are on the NPL. The respective action and the implementation of the action at each site are presented in subsequent paragraphs. Appendix A presents a summary of the documents reviewed for this five-year review.

ST. LOUIS DOWNTOWN SITE

As stated previously, one of the subjects of this five-year review concerns the remedial action conducted at the SLDS Accessible Soil and Ground-Water OU from January 2009 through December 2013. The remedial action for the SLDS Accessible Soil and Ground-Water OU presented in the SLDS ROD (USACE 1998a) will be protective of human health and the environment upon attainment of the cleanup goals; will meet applicable or relevant and appropriate requirements (ARARs); and was developed to provide the best balance of effectiveness, cost, and implementability. The scope and role of the remedial action set forth in the SLDS ROD (USACE 1998a) are to remediate accessible soil and ground-water contamination that resulted from MED/AEC uranium manufacturing and processing activities conducted at the Mallinckrodt Property.

The SLDS ROD (USACE 1998a) was signed on August 3, 1998, by Russell L. Fuhrman, Major General, U.S. Army Director of Civil Works, and on August 27, 1998, by Dennis Grams, Professional Engineer Regional Administrator, USEPA Region 7.

Prior to selection of the remedial action for the SLDS for accessible soil and ground water, several properties were addressed under removal action authority. These properties include Plant 10 (City Block 1201, former Plant 4), the land east of the St. Louis Flood Protection levee system for the Mississippi River (St. Louis Riverfront Trail), and several buildings at the Mallinckrodt Property. Post-remedial action risk assessments have been conducted for Plant 10 and the St. Louis Riverfront Trail to reconfirm the protectiveness of the removal actions (USACE 2005c, 2006b).

The other OU at the SLDS is the ISOU. The ISOU includes all media at the SLDS not covered by the SLDS ROD (USACE 1998a) that may have become contaminated as a result of the deposition or migration of MED/AEC-related contaminated media (USACE 2012a). According to the SLDS ISOU RI/BRA Report, media within the scope of the ISOU include:

- Soil that is inaccessible due to the presence of buildings and other permanent structures, including the subsoil within the footprint of a structure for which remediation would reasonably be expected to affect the stability of the structure.
- Soil located under active railroads and roadways, including the supporting soil in the associated ROW.
- Soil on the exteriors and interiors of buildings and permanent structures.
- Sewers (e.g., structures and interior sediment) and soil adjacent to sewers not directly encountered within an excavation area during the remedial action conducted under the SLDS ROD.

The ISOU is outside the scope of this five-year review. The ISOU is being addressed in accordance with a separate CERCLA action. The USACE is following the CERCLA process to evaluate the threat or potential threat to human health and the environment caused by the ISOU to determine the appropriate response. The MDNR and the USEPA are participating in this process.

SLDS Remedial Action Selection

Characterization activities conducted at the SLDS determined that contamination related to MED/AEC activities is present in accessible soil at the Mallinckrodt Property and VPs at levels that require remedial action. The remedial action ultimately selected was identified as Selective Excavation and Disposal, although treatment to cost-effectively reduce the mobility and toxicity of the radioactivity to acceptable risk levels was initially retained as a conditional part of the remedy. Treatment was further evaluated during the design phase and was subsequently not identified as a cost-effective remedy that reduced the contaminant's volume, toxicity, or mobility. Therefore, treatment was not included in the remedial action.

The remedial action objectives (RAOs) for the SLDS Accessible Soil and Ground-Water OU, as set forth in the SLDS ROD (USACE 1998a), are to:

Soil

- prevent exposures from surface residual contamination in soil greater than the criteria prescribed in 40 *CFR* 192;
- eliminate or minimize the potential for humans or biota to contact, ingest, or inhale soil containing contaminants of concern (COCs);
- eliminate or minimize volume, toxicity, and mobility of affected soil;
- eliminate or minimize the potential for migration of radioactive materials offsite;
- comply with ARARs; and
- eliminate or minimize potential exposure to external gamma radiation.

Ground Water

- remove sources of COCs in the A Unit (HU-A); and
- continue to maintain low concentrations of OU COCs in the B Unit (HU-B).

The major components of the remedial action presented in the SLDS ROD include:

- excavation of accessible soil to composite criteria (ARAR-based) on perimeter VPs and Mallinckrodt Plant 7;
- excavation of accessible soil on the Mallinckrodt Property (except Plant 7) to composite criteria (ARAR-based) in the top 4 or 6 ft (1.2 or 1.8 m) and to depth to deep-soil criteria (risk-based);
- control of potential ground-water degradation by removal of sources of soil contamination;
- removal, treatment, and disposal of ground water from excavations within the A Unit (HU-A);
- implementation of institutional controls, when applicable; and

- perimeter ground-water monitoring in the B Unit (HU-B) to assure post-remediation compliance.

The RGs for the SLDS Accessible Soil and Ground-Water OU, as set forth in the SLDS ROD (USACE 1998a), consist of the following general components:

Soil

- Excavation of accessible surface soil according to the ARAR-based composite criteria of 5 picocuries per gram (pCi/g) above background for the greater of Ra-226 or thorium (Th)-230, 5 pCi/g above background for the greater of Ra-228 or Th-232, and 50 pCi/g above background for U-238 in the uppermost 6 inches (15 cm) below ground surface (bgs) (5/5/50 criteria). To concurrently address each of the major radionuclides of interest, a sum of the ratios calculation is applied.
- Excavation of accessible subsurface soil (6 inches [15 cm] bgs) according to the ARAR-based subsurface criteria of 15 pCi/g above background for the greater of Ra-226 or Th-230, 15 pCi/g above background for the greater of Ra-228 or Th-232, and 50 pCi/g above background for U-238 to a depth of 4 or 6 ft (1.2 or 1.8 m) bgs of the SLDS (15/15/50 criteria). These criteria will be met to a depth of 6 ft (1.8 m) bgs in areas of Mallinckrodt located west of the St. Louis Terminal Railroad Association (TRRA) tracks (DT-9) and at the former locations of Buildings 116 and 117 in Plant 6 East Half (EH). These criteria will be met at the remaining areas of the SLDS to a depth of 4 ft (1.2 m) bgs except at the Plant 7 area and VPs, where these criteria are applied to depth.
- Excavation of accessible deep subsurface soil (4 or 6 ft [1.2 or 1.8 m] bgs) to the risk-based criteria of 50 pCi/g above background for Ra-226, 100 pCi/g above background for Th-230, and 150 pCi/g above background for U-238 in the Mallinckrodt Property portion of the SLDS (50/100/150 criteria). To concurrently address each of the major radionuclides of interest, a sum of the ratios (SOR) calculation is applied.
- For arsenic and cadmium: (1) excavation of accessible soil to the criteria of 60 milligrams per kilogram (mg/kg) of arsenic and/or 17 mg/kg of cadmium to a depth of 4 or 6 ft (1.2 or 1.8 m) bgs and (2) excavation of accessible soil to the criteria of 2,500 mg/kg of arsenic and/or 400 mg/kg of cadmium from 4 or 6 ft (1.2 or 1.8 m) bgs to depth. Based on the distribution of metal COCs at the SLDS, as shown on Figure 5-7 of the SLDS ROD, arsenic and cadmium are COCs only in Plants 2, 6, 7 North (7N), 7 South (7S), and 7 West (7W), and DT-10 (USACE 1998a).

Ground Water

- Perimeter monitoring of the ground water in the HU-B during and after source-term removal will be implemented. The ground-water monitoring will also establish the effectiveness of the source removal. The goal of the monitoring will be to determine if COCs are present above the SLDS-ROD-specified investigative limits (ILs) and to provide sufficient sampling data to support an evaluation of the fate and transport of MED/AEC residual contaminants through and following the remedial action.

For soil, RGs for radiological contaminants are applied to concentrations above background consistent with the ARAR (40 *CFR* 192) from which they derive. The surface and subsurface soil RGs in 40 *CFR* 192, Subpart B, for Ra-226 are 5 and 15 pCi/g, respectively, as an areal average concentration above background in the top 6-inch (15-cm) layer and in subsequent 6-inch (15-cm) layers, respectively. The USEPA's guidance documents for the cleanup of

CERCLA sites using 40 *CFR* 192 as an ARAR set forth the USEPA's expectation that remediation of subsurface soil contamination will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. Results of excavations performed at the SLDS indicate that residual concentrations of radium generally average less than the 5 pCi/g surface criteria and generally are not significantly above background. The results also demonstrate that implementation of the subsurface remediation criterion of 15 pCi/g for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g.

The Th-230 surface and subsurface RGs established in the SLDS ROD are also consistent with a residual Ra-226 concentration of 5 pCi/g. Constraining the concentration of Th-230 in surface and subsurface soils to 15 pCi/g, along with the use of the unity rule, assures that the concentration of Ra-226 does not exceed 5 pCi/g during the 1,000-year time period. Based on post-remediation data from various properties at the SLDS, these RGs achieve doses that are less than 12 millirem per year (mrem/yr) in practice. In addition, risk assessments performed to date have determined that the RGs would achieve protectiveness to levels within the CERCLA risk range and below a hazard index (HI) of 1.

Supplemental standards for soil at depth were developed pursuant to 40 *CFR* 192.21. Supplemental standard soil RGs are appropriate in accordance with criteria specified in 40 *CFR* 192.21 (c), which states that supplemental standards may be applied under circumstances where removal would result in excessive remedial action costs relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard, given the configuration and appropriate institutional controls. For accessible deep subsurface soil (below 4 or 6 ft [1.2 or 1.8 m] bgs) at the Mallinckrodt Property portion of the SLDS, excavation is conducted to risk-based RGs of 50 pCi/g for Ra-226, 100 pCi/g for Th-230, and 150 pCi/g for U-238. Deep soil has a more limited potential for exposure than surface soil or shallow soil. The risk-based deep soil RGs are protective at the SLDS under industrial use conditions, with land use restrictions to ensure that future residential use is precluded at the site.

Appendix B provides summary tables of the final status survey (FSS) data for soil at the SLDS areas completed prior to the end of the five-year review period. These tables confirm that the requirements of 40 *CFR* 192, Subpart B, have been met.

The remedial action for the SLDS includes the excavation and off-site disposal of accessible contaminated soil to RGs established in the SLDS ROD (USACE 1998a). Contaminated sediment in sewers and drains considered to be accessible is removed along with the accessible soil. Only approved off-site borrow would be used to fill excavations at the perimeter VPs and in the top 4 to 6 ft (1.2 or 1.8 m) across the Mallinckrodt Property. A post-remedial action risk assessment is performed upon completion of excavation and restoration (i.e., backfilling and placement of cover [asphalt, concrete, etc.]) to describe the level of risk remaining from MED/AEC COCs following completion of remedial activities. Material that does not exceed the deep soil (risk-based) criteria and is not a characteristically hazardous waste may be used, with prior notification to the MDNR, as backfill 4 or 6 ft (1.2 or 1.8 m) bgs, as appropriate, on the Mallinckrodt Property of the SLDS (except in Plant 7).

A long-term ground-water monitoring strategy for the Mississippi Alluvial Aquifer (HU-B) is also being implemented under the SLDS ROD. As required under the SLDS ROD, if monitoring of HU-B shows that the ILs have been exceeded, a ground-water remedial action alternative assessment (GRAAA) must be initiated. The phases of the GRAAA consist of assessment (Phase 1), investigation (Phase 2), feasibility (Phase 3), and proposed remediation (Phase 4). Ground-water sampling results exceeding the total uranium IL in an HU-B monitoring well (DW19)

resulted in the initiation of Phase 1 of the GRAAA (USACE 2003c). Phase 2 of the GRAAA has not been initiated. Phase 2 will be conducted following completion of remedial activities at Plant 6 West Half (WH) in order to assess if remediation results in a decrease in the COC concentrations in HU-B ground water. The results of Phase 2 will be presented in a subsequent five-year review report.

The primary objectives of the well sampling are to (1) assure that protection of human health and the environment is being preserved; and (2) establish the effectiveness of the source removal action. Well sampling is conducted in both the shallow and deep water horizons. The deeper water (HU-B) needs to be protected, and the GRAAA will evaluate any contaminants in the deeper water and determine if additional response actions are required. The protective sampling is to ensure that the environment is not being degraded by the site's remedial action.

Final determinations as to whether institutional controls are necessary at the remediated areas will be based on calculations of post-remedial action risk derived from actual residual conditions. Residual dose and risk assessments are performed using three different receptor scenarios (on-site residential receptor, utility worker, and industrial/construction worker) as the potential receptors for the site. Although not required by the SLDS ROD, the resident receptor is evaluated for informational purposes. The potential exposure pathways are direct contact, ingestion, inhalation of dust, and external gamma. In addition to these pathways, the resident is evaluated for home-grown produce consumption. The USEPA generally defines the CERCLA target risk range as 1×10^{-6} to 1×10^{-4}.

Evaluation of the Mississippi River riverbed in the vicinity of the SLDS is a component of the SLDS remedial action. During the investigation of the SLDS as part of the SLS RI Report (DOE 1994), sediments containing radioactivity were found in a small area of the Mississippi River bed. A subsequent investigation as part of the *Remedial Investigation Addendum for the St. Louis Site* (SLS RI Addendum) (DOE 1995b) could not relocate radioactivity on the riverbed. Presumably it was carried downstream during high flows. On December 3, 2007, 17 sediment samples were collected to characterize the extent of contamination that may exist in the Mississippi River riverbed. The sediment samples from each of the river sampling locations were submitted for radiological analysis. One of the sampling locations contained concentrations of radiological COCs that exceed the SLDS ROD RGs. This sampling location is within the accessible portion of the City Property VP (DT-2) and is being addressed by remedial activities being conducted at DT-2.

Because the removal action conducted along the St. Louis Riverfront Trail on the strip of land east of the levee and west of the Mississippi River was subject to different exposure and land use assumptions than those used in the SLDS ROD (USACE 1998a), a post-remedial action risk assessment was conducted as a component of the SLDS remedy to determine whether land use restrictions are required on this portion of the SLDS. The results of the residual risk assessment for the St. Louis Riverfront Trail indicate that residual dose and risk are protective for all recreational users (USACE 2006b). However, both the dose and risk criteria were exceeded for the on-site resident. Additional sampling has been conducted to delineate the contaminated area, and further remediation of the area was initiated in CY 2011 as part of the remediation activities being conducted for the City Property VP (DT-2).

Another component of the SLDS remedy is the performance of a post-remedial action risk assessment to reconfirm the protectiveness of the removal action conducted at Mallinckrodt Plant 10. A residual dose and risk assessment was performed for Plant 10 in August 2005 (USACE 2005c). The results of the assessment indicate that residual dose and risk

at Plant 10 are protective for utility and industrial workers, as well as on-site residential receptors, and the site meets the criteria for use without any land use restrictions.

The SLDS ROD addressed accessible soil contamination and ground-water contamination. The SLDS ISOU, consisting of inaccessible soil areas, buildings and structures, and inaccessible sewers, was excluded from the scope of the SLDS ROD and is not in the scope of this five-year review. The SLDS ISOU is being addressed under a separate CERCLA process.

SLDS Remedial Action Implementation

As part of the remedial action implementation for the SLDS, PDIs were conducted on the various SLDS properties to obtain the information necessary to develop the remedial design (RD) documents. Common to remedial action implementation at each Mallinckrodt Property or VP is the coordination with the property owner; establishment of a central support facility, water treatment facility, and soil storage and loadout facility (SSLF); implementation of air monitoring, access controls, and security measures; and sequencing of excavation, confirmation, and FSS activities. Support facilities include personnel and equipment decontamination facilities.

The central support facility was established on the eastern portion of Plant 7N at the initiation of FUSRAP field activities. In order to accommodate characterization of Plant 7N, the support compound was moved to the Midwest Waste VP (DT-7) in 2002. The water treatment plants are located in the northwest corner of Plant 6 WH and at the Plant 7S support compound.

The purpose of the waste-water treatment facility is to store and treat excavation water removed during excavation activities. All potentially contaminated waters are processed through the waste-water treatment plants and the treated water is discharged to the Metropolitan St. Louis Sewer District (MSD) sewer line in accordance with the MSD authorization letter dated October 30, 1998 (MSD 1998). The authorization was revised in a July 23, 2001, MSD authorization letter (MSD 2001a) and amended in an October 13, 2004, MSD letter (MSD 2004). The authorization has been extended through the issuance of letters dated June 19, 2006; May 22, 2008; May 10, 2010; and May 24, 2012 (MSD 2006a, 2008a, 2010a, and 2012a). The discharge is directed to the Bissell Point Treatment Plant through underground mains. Each discharge is monitored, and the results are reported to the MSD.

One soil storage and railroad car loading facility is currently established at the SLDS. The Plant 6WH SSLF is located in the former rail spur area at the northern end of Plant 6WH. Once loaded into the railcars, the excavated material is covered and sent out of state for disposal. Material is disposed, depending on the concentration of the contamination, at either US Ecology of Idaho in Idaho or EnergySolutions (formerly Envirocare) in Utah. US Ecology of Idaho is an RCRA Subtitle C disposal facility permitted to accept wastes containing low-activity or exempt radioactive wastes. EnergySolutions is a low-level radioactive waste disposal facility.

Excavation perimeter air monitoring is conducted during excavation activities. Monitoring consists of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring is conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Indoor and outdoor air radon monitoring is conducted to determine whether radon releases are occurring.

The remediation activities planned for each property are described in a remedial action work description (RAWD). An RD is developed for each property based on the results of the PDI and existing site conditions. Accessible soil that has concentrations of COCs exceeding the RGs is

excavated in accordance with the RD and transported by truck to the soil loadout area. The contaminated soil is then either loaded directly into railcars or stockpiled for future loadout and transportation for final disposal at an out-of-state facility. Gamma walkover surveys (GWSs) and soil sampling are performed to guide excavation by identifying locations of contaminated soil, and to identify when the RGs have been met. If the analytical results from samples collected from the excavated areas indicate that the RGs have not been met, then additional excavation, GWSs, and re-sampling, if required, are performed. This sequence is repeated until the concentration-based RGs are met.

The primary means of access control is provided by security fencing surrounding each excavation area. Prior to the commencement of work, temporary chain-link fences, gates, and/or other barriers are installed around the remediation work area. Additional safety fencing is also installed at specific excavation locations as determined by site conditions. All non-remediation pedestrian traffic is excluded from construction zones. Access exclusion is established through the use of temporary chain-link fences, barricades, orange construction fencing, and/or radiation rope. Appropriate warning signs are posted on or adjacent to contaminated areas.

Once informational sampling demonstrates that the contamination has been removed, FSS confirmation sampling is conducted. The FSS is typically conducted by an independent contractor. The USACE evaluates the results to ensure that the residual concentrations in the excavation meet the SLDS ROD (USACE 1998a) RGs and the excavation can be backfilled. Following the completion of backfilling, the excavated areas are regraded, compacted, and resurfaced with the same type of material initially present (e.g., asphalt, concrete, gravel). Following resurfacing, a topographic survey of the excavation areas is completed to document backfill volumes and final conditions.

Post-remedial action reports (PRARs) are prepared to document the series of response actions performed and the final status survey evaluations (FSSEs) conducted at each remediated property. As part of this documentation, post-remedial action risk assessments are performed to describe the level of residual risk from COCs remaining following completion of remedial activities.

The required remedial action at the SLDS is not complete as of December 2013; however, remediation has been completed at a portion of the Mallinckrodt Property and VPs. A summary of the remedial activities conducted at the SLDS through December 2013 is presented in Table IV-1 in chronological order. Shaded properties are those for which remedial activities were conducted during this five-year review period (January 2009 through December 2013). The completed properties at the SLDS that did not require remediation are listed in Table IV-2. The remediation status of the SLDS properties at the end of the review period (December 2013) is shown on Figure IV-1. The results of the post-remedial action risk assessments (i.e., maximum residual risk and maximum residual dose) for those properties where PDI-FSSEs or PRAR-FSSEs were completed during this five-year review period are presented in Table VI-33.

Table IV-1. Summary of Remedial Activities Conducted at the SLDS

Location	Property	Start	Complete	Volume Removed (yd^3)
Mallinckrodt	Plant 2[a]	October 1998	August 2000	9,659
	Additional remediation associated with sewer lines at Plant 2[b]	June 2011	In Progress	*
DT-2	City Property VP[b,c]	October 1998	In Progress	51,550
Mallinckrodt	Plant 1	July 2000	September 2003	2,410
Mallinckrodt	Plants 6EH and 6E	December 2000	July 2008	23,085
	Additional remediation in Plant 6EH conducted concurrently with Building 101 remediation at Plant 6WH	December 2012	In Progress	*

Table IV-1. Summary of Remedial Activities Conducted at the SLDS (Continued)

Location	Property	Start	Complete	Volume Removed (yd^3)
DT-7	Midwest Waste VP	May 2001	January 2003	3,910
DT-6	Heintz Steel and Manufacturing VP	April 2003	March 2004	1,660
	Additional remediation associated with storage building	December 2009	December 2009	150
DT-10	Thomas and Proetz Lumber Company VP	June 2003	June 2006	1,995
Mallinckrodt	Plant 7E	July 2003	September 2003	1,775
DT-11	City of Venice, Illinois (formerly McKinley Bridge), VP (currently owned by the Illinois Department of Transportation and MoDOT)	October 2003	January 2004	2,834
Mallinckrodt	Plant 6WH[b]			
	Phase 1	June 2004	December 2004	3,513
	Phases 2A (Rail Spur Area) and 2C (North of Building 101)	2005	2007	*
	Phase 2B	March 2008	November 2010	30,300
	Building 101	December 2012	In Progress	11,180
DT-29	Midtown Garage VP	October 2004	October 2004	51
Mallinckrodt	Plant 7N	February 2005	August 2006	14,324
	Plant 7N (Hazardous Waste Storage Area Footprint, Survey Unit [SU]-9)	November 2010	July 2011	2,240
Mallinckrodt	Plant 7S	February 2005	March 2007	3,630
	Additional remediation of small area in Plant 7S conducted during remediation of DT-12	July 2010	November 2010	150
DT-4	Gunther Salt VP			
	GSS[d]	April 2006	December 2011	426
	GSN	October 2006	August 2007	2,445
Mallinckrodt	Plant 9 and Security Gate Number 49 Area	July 2006	August 2006	22
DT-8	PSC Metals, Inc. VP	September 2006	March 2008	8,071
DT-17	Christiana Court, LLC VP	August 2007	August 2007	47
DT-3	Norfolk Southern Railroad VP	October 2007	November 2007	243
NA	TRRA Soil Spoils Area	August 2008	August 2008	147
DT-9	TRRA VP	February 2009	June 2009	2,440
DT-12	BNSF Railroad VP	May 2010	September 2011	2,290[e]
Mallinckrodt	Plant 7W[b] – 700 Pad	April 2011	May 2012	10,150
NA	Kiesel Hall Street Property	May 2013	In Progress	*
NA	Kiesel Riverfront Property	January 2011	March 2011	267

* Final volume removed is not available as the remedial action is in progress and/or the PRAR-FSSE report for this area is not yet completed.

[a] With the exception of remedial actions associated with a formerly inaccessible sewer line at Plant 2, all remedial actions have been completed at Plant 2.

[b] Additional remediation activities are planned for these properties, so the associated soil volumes shown do not necessarily represent final volumes removed. Rather, for these properties, the volumes presented represent the amount of soil removed between the "Start" and "Complete" dates shown.

[c] In July 1999, a remedial action was completed west of the levee in the central and southern portions of DT-2. Between March 2009 and December 2011, an additional remedial action was completed for the portion of DT-2 located west of the levee in the Destrehan Street ROW between the west toe of the levee and the BNSF Railroad VP (DT-12). Remediation of the remaining portions of DT-2 located east of the levee is ongoing.

[d] Remediation was initially conducted at GSS between April and July 2006 (382 yd^3 [292.1 m^3]). Additional remediation was conducted at GSS between May 2010 and December 2011 to address a contaminated area located along the eastern property line adjacent to DT-12 (44 yd^3 [33.6 m^3]).

[e] Volume removed for DT-12 also includes a small portion of the adjacent Plant 7S and Plant 7N properties, as well as a portion of the Destrehan Street ROW.

Notes:

Shaded properties are those for which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

This table does not include completed properties for which remedial actions were not required.

NA = Not Applicable

Table IV-2. SLDS: Completed Properties Not Requiring Remediation[a]

Location	Documentation of Final Status Survey Evaluation Results
DT-1	*Final Status Survey Evaluation for the St. Louis Downtown Site Archer Daniels Midland Vicinity Property (DT-1),* St. Louis, Missouri, Rev. 0, June 2002 (USACE 2002a).
Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots	*Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties West of Broadway, Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots,* St. Louis, Missouri, Rev. 0, May 25, 2006 (USACE 2006c).
West of Broadway VPs[b]: DT-20, DT-21, DT-22, DT-23, DT-24, DT-25, DT-26, DT-27, DT-28, DT-30, and DT-36	*Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties West of Broadway, Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots,* St. Louis, Missouri, Rev. 0, May 25, 2006 (USACE 2006c).
DT-35 and DT-36[c]	*Pre-Design Investigation and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Properties DT-35 and DT-36,* St. Louis, Missouri, Rev. 0, April 3, 2009 (USACE 2009a)
South of Angelrodt Properties: DT-5, DT-13, DT-14, DT-16, DT-18, and Second Street Corridor	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor,* St. Louis, Missouri, October 25, 2010 (USACE 2010b).
DT-15	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Metropolitan St. Louis Sewer District Lift Station (DT-15),* St. Louis, Missouri, Rev. 0, August 27, 2012 (USACE 2012b).
DT-34	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property DT-34,* St. Louis, Missouri, Rev. 0, September 21, 2012 (USACE 2012e).
DT-37	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Downtown Site Vicinity Property Lange-Stegmann (DT-37),* St. Louis, Missouri, Rev. 0, September 23, 2013 (USACE 2013a).

[a] Completed properties are those for which remedial actions were not required and the FSSE was completed prior to the end of this five-year review period (December 2013).

[b] DT-29 is included in the West of Broadway VPs. A small area on DT-29 was remediated in October 2004.

[c] DT-36 is included in the West of Broadway VPs.

Note:

Shaded properties are those for which the FSS was completed during this five-year review period (January 2009 through December 2013).

Those areas for which remedial actions were completed prior to the third five-year review period (i.e., pre-January 2009) are discussed in Section IV of the Second Five-Year Review Report (USACE 2010a) and are thus not further addressed herein. Areas where remedial activities were conducted during the third five-year review period (January 2009 through December 2013) are presented as follows, chronologically by start date.

SLDS - Remedial Actions Conducted During Third Five-Year Review Period

Remedial actions were performed at the following Mallinckrodt plants and SLDS VPs during the period of this review: Plant 2, City Property VP (DT-2), Plant 6EH, Heintz Steel and Manufacturing VP (DT-6), Plant 6WH, Plant 7N, Plant 7S, Gunther Salt VP (DT-4), TRRA VP (DT-9), Burlington Northern Santa Fe (BNSF) Railroad VP (DT-12), Plant 7W (700 Pad), and the Kiesel Hall Street Property.

Mallinckrodt Plant 2

Remedial activities at Plant 2 (i.e., design through backfilling and site restoration) were conducted between October 1998 and August 2000. The following activities were major

components of the remedial activities implemented at Plant 2. The foundations of Buildings 50, 51, 51A, 52, and 52A were demolished. Several water and fire suppression lines were temporarily capped and removed. Manholes and catch basins exposed during excavation were supported or replaced. On-site stockpiled crushed concrete, brick, and/or cinder block from previously demolished Mallinckrodt buildings, foundations, or other consolidated material having radionuclide concentrations below the composite criteria of the SLDS ROD (USACE 1998a) and exhibiting no hazardous characteristics, as determined by the Toxicity Characteristic Leaching Procedure, were used for backfilling excavations to levels 6 ft (1.8 m) bgs on Mallinckrodt Property. Clean off-site borrow material was used to backfill excavations from 6 ft (1.8 m) bgs to the surface.

A total of approximately 9,659 in situ yd^3 (7,385 m^3) of contaminated materials were removed from Plant 2. Excavated soils were transported to an SSLF and loaded into lined railcars for transport to and disposal at Envirocare of Utah, a low-level radioactive waste disposal facility. Approximately 5,700 yd^3 (4,358 m^3) of crushate were placed as deep backfill in the Plant 2 main excavation from total depth to no higher than 6 ft (1.8 m) bgs.

The *Post-Remedial Action Report for the Accessible Soils Within the St. Louis Downtown Site Plant 2 Property* (USACE 2002b) was completed in 2002. The analytical results for the FSS samples indicated that the residual radioactivity in the accessible areas at Plant 2 met the requirements of the RD and was below the 15/15/50 SLDS ROD RGs. In addition, analytical results for arsenic and cadmium were below the SLDS ROD RGs. The results of the post-remedial action risk assessment indicate that the concentrations of COCs remaining at the remediated areas meet the CERCLA target risk range of 10^{-6} to 10^{-4}. Thus, the accessible areas of Plant 2 meet the criteria for unrestricted use.

In June 2011, a formerly inaccessible area located north of the main excavation was made available for remediation by the owner. Contaminated soils were excavated and sheet piling was installed adjacent to a sewer line that runs parallel to the northern edge of the main excavation. Additional remediation involving excavation of the sewer and associated contaminated soil is planned for a later date.

City Property VP (DT-2)

The City Property VP (DT-2) is located east of the Mallinckrodt facility between the BNSF Railroad (DT-12) and the Mississippi River. The USACE completed RD activities for accessible soil areas in the central and southern portions of DT-2 located west of the levee between August and September 1998. The RD partitioned the City Property Work Area into six separate excavation areas, Areas A through F. Excavation of contaminated soil began on October 14, 1998, and site restoration activities (i.e., grading and revegetation) were completed on July 8, 1999. No unexpected events of note occurred during the remedial action completed in 1999 at DT-2.

Contaminated soil was transported to the Plant 7S SSLF and loaded into lined railcars for transport to the Envirocare facility in Utah, a low-level radioactive waste disposal facility. Approximately 4,260 in situ yd^3 (3,257 m^3) of contaminated materials were removed from DT-2.

The *Post-Remedial Action Report for the St. Louis Downtown Site City-Owned Vicinity Property* was completed in 1999 for the remedial action in the central and southern portions of DT-2 located west of the levee (USACE 1999b). The analytical results for the FSS samples indicated that the residual radioactivity on DT-2 met the requirements of the RD and was below the SLDS ROD (USACE 1998a) remediation criteria. The post-remedial action risk assessment has

shown that the concentrations of COCs remaining at the remediated areas meet the CERCLA target risk range of 10^{-6} to 10^{-4}. Thus, the remediated areas meet the criteria for unrestricted use.

The PDI activities for the remaining portions of DT-2 were conducted in August 2003 and between February 2007 and November 2008 (USACE 2009b). Based on the PDI results, 10 radiological contamination areas (Areas 1 through 10) were identified. The DT-2 remedial actions were then subdivided into Phase 1, west of the levee (Area 6), and Phase 2, east of the levee for the remaining nine areas (Areas 1 through 5 and Areas 7 through 10).

The Phase 1 portion of the DT-2 remedial action is located west of the levee in the Destrehan Street ROW between the west toe of the levee and the BNSF Railroad VP (DT-12), and includes an area of approximately 13,067 square feet (ft^2) (1,214 m^2). The Phase 1 remediation activities began on March 23, 2009, and were completed on December 29, 2011 (USACE 2012c). The excavation design required sheet pile shoring along the west toe of the levee to protect its integrity from potential under-seepage and on the north and south sides of the excavation to facilitate the deep excavation in the limited area. Excavation activities were initiated on May 4, 2009, following completion of the sheet pile installation and after a brief delay caused by high levels of the Mississippi River. The remedial action of the Phase 1 area also included removal of the inactive portions of the sewers, as well as removal and replacement of the active portions of the sewers. Approximately 235 linear ft (71.6 m) of active sewers and approximately 170 linear ft (51.8 m) of inactive sewers and manholes were removed as required for the remediation of this portion of DT-2 (USACE 2012c). Approximately 4,200 in situ yd^3 (3,211 m^3) of contaminated materials were excavated from the Phase 1 area.

The sheet pile shoring could not be extended to the west end of the Phase 1 area under the elevated trestle, which limited the excavation required to safely remove all contaminated soil surrounding the sewers beneath the overhead structure. In 2011, the remaining contaminated soil on this portion of the Phase 1 area was removed during remediation of the contaminated soil associated with the Destrehan Street 30-inch (76.2-cm) MSD sewer line. A slide rail shoring system suitable for use underneath the elevated trestle was utilized to facilitate remediation.

The Phase 2 portion of DT-2 addresses the balance of DT-2 remediation of the east side of the levee. Due to the proximity of the river, the Phase 2 work required daily monitoring of Mississippi River levels to follow USACE River Stage/Excavation Guidelines. Site restoration activities included replacement of the clay cap layer with a vegetation cover and riprap protection for the river bank to minimize seepage and erosion adjacent to the river.

Six areas in the Phase 2 east of the levee portion of DT-2 (Areas 3, 4, 5, 7, 8, and 9) were found to exceed the SLDS ROD RGs. Remediation and restoration activities at Areas 4, 5, and 9 were performed between January and April 2011. The excavation activities resulted in the removal of approximately 800 in situ yd^3 (611.6 m^3) of contaminated soils from these three areas. Remediation and restoration activities were conducted on Area 3 of DT-2 Phase 2 east of the levee between February and November 2011. The remediation of this area included excavation depths extending to approximately 22 ft (6.7 m) for the removal of approximately 7,900 in situ yd^3 (6,040 m^3) of contaminated soils.

In October 2011, remediation began at the two final excavation areas, Area 7 and Area 8, of DT-2 Phase 2, east of the levee, along the abandoned portion of the Destrehan Street sewer. More than 200 linear ft (60.1 m) of sheet pile shoring had been previously installed along the eastern side of the levee toe to facilitate remediation of the area. The planned excavation of this area was delayed until required river levels were reached such that sewer outfall structures were exposed for periods long enough to allow remediation. The dry weather and low flow conditions

of the Mississippi River in CY 2012 aided the safe removal of abandoned 15-inch and 30-inch (38.1-cm and 76.2-cm) sewer outfall structures located in the river. Between October 2011 and the end of the third five-year review period (December 31, 2013), remediation of these two excavation areas resulted in the removal of approximately 38,350 in situ yd^3 (29,321 m^3) of contaminated soil. The total in situ volume removed from DT-2 is 51,550 in situ yd^3 (29,321 m^3) of contaminated soil.

Remediation activities for the Phase 2 portion of DT-2 are ongoing. Upon completion of the remediation, a PRAR-FSSE report for the accessible soil at the Phase 1 and Phase 2 portions of DT-2 will be developed and will be submitted to the MDNR and the USEPA for review and comment prior to finalization.

Mallinckrodt Plant 6 East Half

Prior to development of the RD for Plant 6EH, a PDI was conducted to gather additional subsurface data to support the design of the remedial action. The PDI data showed that radionuclide contamination was extensive in Plant 6EH (*Pre-Design Investigation Data Summary Report, Plants 6 East Half and 6E, FUSRAP St. Louis Downtown Site* [IT 2000]). The majority of the contamination appeared to be present within the fill material to a depth of 4 ft (1.2 m) bgs. Contamination was present in two deep areas at 12 and 20 ft (3.7 and 6 m) bgs. The chemical data collected during the PDI indicated that arsenic and cadmium concentrations did not exceed the RGs established in the SLDS ROD.

Remedial activities consisting of the excavation of contaminated soils at Plant 6EH were conducted concurrently with remedial activities at Plant 6 East (6E) between December 5, 2000, and July 3, 2008. After remedial operations began, it became apparent that the contamination was more extensive, both vertically and horizontally, than originally anticipated based on the PDI sampling. Many challenges were encountered during the remedial activities at Plant 6EH. Several abandoned underground foundations and abandoned underground utilities were encountered during excavation. The demolition and removal of the large abandoned foundations of Buildings 116 and 117 to gain access for excavation of the contaminated soils below these foundations was a particularly significant activity requiring additional construction time and special equipment. These foundations included large pile caps and deep piles to support heavy equipment housed by the buildings. Removal of the abandoned utilities from the buildings was also required, as was the relocation of active utilities around the area(s) to be remediated.

Approximately 23,085 in situ yd^3 (17,650 m^3) of contaminated materials were excavated from Plants 6E and 6EH by the end of 2008. Verification sampling showed that the concentrations of arsenic and cadmium in the remediated areas were less than the RGs.

Remediation of Plant 6E is complete. Remediation of Plant 6EH is ongoing. A formerly inaccessible area located at the western edge of Plant 6EH is currently being remediated along with portions of Plant 6WH as part of the remediation of the former Building 101 area. This area was reclassified as accessible when the building was demolished in 2012. The PRAR-FSSE report for the accessible soils at Plant 6E and 6EH is currently being developed and will be submitted as part of the PRAR-FSSE report for Plant 6 to the MDNR and the USEPA for review and comment prior to finalization.

Heintz Steel and Manufacturing VP (DT-6)

The Heintz Steel and Manufacturing VP (DT-6) was investigated to 2 ft (0.6 m) bgs during PDI activities. The PDI data indicated three areas of shallow (0.5 ft [0.2 m] bgs) radiological

contamination in the fill material (IT 2001a). The three areas of radiological contamination appeared to be randomly located, with no specifically identifiable source.

Due to the degree and extent of contaminated soil encountered at DT-7 during excavation activities, further evaluation of historical land elevations and aerial photographs was conducted for DT-6. The results of this evaluation indicated that the subsurface zone of contamination present at DT-7 coincides with the horizon that was the land surface at the time of MED/AEC activities, which began in 1941. This horizon was expected to be present at DT-6 at 4 to 5 ft (1.2 to 1.5 m) bgs. The PDI sampling conducted on DT-6 did not encounter the zone of contamination identified at DT-7.

Remedial activities began on April 21, 2003, and were completed on March 1, 2004. As part of these remediation activities, sampling of several trenches, excavated to a depth of approximately 4 ft (1.2 m), was conducted to determine if the deeper zone of contamination encountered on DT-7 was present on DT-6, and if so, to what extent. The analytical results from these supplemental sampling efforts indicated subsurface radiological contamination was present at DT-6 at concentrations greater than the RGs. These additional results were used in the final excavation RD. An estimated 1,660 in situ yd^3 (1,269 m^3) of soils were excavated from DT-6 (USACE 2005d).

The *Post-Remedial Action Report for the Accessible Soils Within the St. Louis Downtown Site Heintz Steel and Manufacturing Vicinity Property (DT-6) and Midwest Waste Vicinity Property (DT-7)* has been completed (USACE 2005d). The results of the post-remedial action risk assessment indicate that the concentrations of COCs remaining in accessible areas at DT-6 and DT-7 meet the CERCLA target risk range of 10^{-6} to 10^{-4}. The accessible soil on DT-6 and DT-7 meets the criteria for unrestricted use.

In December 2009, additional sampling and excavation activities were conducted in the northwest, northeast, and southeast corners of the storage building at DT-6. Excavation continued until no additional soil could be removed due to structural stability issues and the presence of concrete foundation piers. The results of additional sampling indicated that radiological contamination is still present in inaccessible soil to a depth of 3.5 ft (1.1 m) in the northeast corner of the building (USACE 2012a). The storage building and remaining inaccessible areas located to the west of the building adjacent to Hall Street are being addressed under the ISOU.

Mallinckrodt Plant 6 West Half

From January 18, 2000, through May 10, 2000, characterization activities for a PDI were conducted at Plant 6WH to support the RD. These activities are described in the *Pre-Design Investigation Summary Report, Plants 6 West Half and 7W, FUSRAP St. Louis Downtown Site, St. Louis, Missouri* (IT 2001b). The majority of the contamination was found in three areas: the southwest end of Building 101, near a fuel oil tank located north of Building 100, and along Destrehan Street to the south. The maximum depth of soil samples with radionuclide concentrations exceeding the SLDS ROD RGs for accessible soils was 17 ft (5.2 m) bgs, which generally corresponds to the depth to the base of the fill. An additional PDI was conducted from February through April 2004 to further delineate the depth and extent of contamination in an area located northwest of Building 101.

The remediation at Plant 6WH is being conducted in phases. Between June and December 2004, Phase 1 of the remedial activities, involving the excavation of an estimated 3,513 yd^3 (2,686 m^3)

of contaminated soils, was conducted in an area located south of Building 101 and north of Destrehan Street at Plant 6WH.

The Phase 2 work was subdivided into Phase 2A, Phase 2B, and Phase 2C. During 2005 and 2006, Phase 2A excavations were conducted in the northwest corner of Plant 6WH. The contaminated soil surrounding and beneath the railroad spur was removed and the area was backfilled. A new rail spur and an adjacent FUSRAP SSLF were installed in 2006. The new SSLF consists of an asphalt pad for soil storage and rail car loading, two water collection sumps, and a runoff collection basin for water management and containment. This SSLF became operational in January 2007.

The Plant 6WH Phase 2B area is located northeast of the intersection of Destrehan and Hall Streets and west of the former location of Building 101 (USACE 2007a). The Phase 2B area included buildings and structures involved in MED/AEC activities as part of the Destrehan Street Manufacturing Plant. The buildings and aboveground structures had been decommissioned and removed, but the underground foundations and utilities were left in place. The Phase 2B area included a 500,000-gallon aboveground storage tank (AST) of fuel oil with associated appurtenances, a pump house (Building 100), a guard house, and an open asphalt paved lot that was previously used for equipment storage. In 2007, the AST and associated appurtenances were removed from the southwest corner of Plant 6WH. Between March 31, 2008, and November 22, 2010, excavation of the Phase 2B area was conducted. Remediation of the Phase 2B area resulted in the removal of approximately 30,300 in situ yd^3 (23,166 m^3) of contaminated soils.

The Plant 6WH Phase 2C area encompassed remediation of the north side of Building 101. This area was completed in CY 2007 concurrent with the remediation of DT-8.

In May 2012, demolition began on Building 101, Mallinckrodt's former Bulk Shipping Center, located in Plant 6WH. Demolition of the superstructure of Building 101 was completed in October 2012. Remediation activities continued with the demolition of the concrete foundation of the building and demolition of abandoned foundations of historical MED/AEC buildings located beneath the building footprint. Starting in December 2012, soil was excavated from the Building 101 area (survey unit [SU]-12, SU-13A, and SU-13B), which has resulted in removal of 11,180 in situ yd^3 (8,548 m^3) of soil. Removal of contaminated soils beneath the structure at Plant 6WH is ongoing. A small area associated with Building 101 located along the western edge of Plant 6EH is being remediated concurrently with the area at Plant 6WH.

Upon completion of the remediation, a PRAR-FSSE report for the accessible soil at Plant 6WH will be developed and will be submitted as part of the PRAR-FSSE report for Plant 6 to the MDNR and the USEPA for review and comment prior to finalization.

Mallinckrodt Plant 7 North

During 2001 to 2003, a PDI was conducted at Plant 7N (USACE 2004b). The highest levels of radiological contamination were identified in samples collected southeast and south of the former Mallinckrodt Hazardous Materials Handling Building at Plant 7N. Samples were also collected for analysis of chemical COCs during the PDI at Plant 7N. Results of the sampling indicate that arsenic and cadmium concentrations do not exceed the RGs established in the SLDS ROD. The results of the PDI are described in the *Pre-Design Investigation Data Summary Report, Plants 7 North and 7 South, FUSRAP St. Louis Downtown Site* (USACE 2004b).

Remedial activities consisting of the excavation of contaminated soils in Plant 7N were conducted between February 7, 2005, and August 30, 2006. A total of approximately 14,324 in situ yd^3 (10,951 m^3) of contaminated materials were excavated from Plant 7N. In

CY 2010, additional remediation activities were conducted at Plant 7N during remediation of the BNSF Railroad VP (DT-12). An excavation area associated with a portion of the Destrehan Street sewer at DT-12 extended into a small area in the adjacent Plant 7N. Excavation in this area in Plant 7N began in July 2010 and was completed in November 2010 (USACE 2014b).

In late CY 2010, further remediation was initiated at Plant 7N in the Hazardous Waste Storage Area (HWSA) (formerly the Hazardous Materials Handling Building). The storage area canopy structure and historical building foundations were removed, making the contaminated soil under the old facility available for remediation. Remedial activities consisting of the excavation of contaminated soils in the HWSA were conducted between November 2010 and December 2011. Approximately 2,240 in situ yd^3 (1,712 m^3) of contaminated materials were excavated from Plant 7N at that time. A PRAR-FSSE report for the accessible soil at Plant 7N is being developed and will be submitted as part of the PRAR-FSSE report for Plant 7 to the MDNR and the USEPA for review and comment prior to finalization.

Mallinckrodt Plant 7 South

Plant 7S is located in the southeastern corner of the Mallinckrodt Property. The eastern portion of Plant 7S is currently used for FUSRAP support facilities, including a water treatment plant for construction-water discharges and a general storage area.

Between 2001 and 2003, a PDI was conducted at Plant 7S to gather subsurface data to support the design of the remedial action. The PDI activities are described in the *Pre-Design Investigation Data Summary Report, Plants 7 North and 7 South, FUSRAP St. Louis Downtown Site* (USACE 2004b). Based on the results of the PDI and previous investigations conducted at Plant 7S, several radiologically contaminated areas were identified throughout Plant 7S. The vertical extent of radiological contamination varied from 1 to 6 ft (0.3 to 1.8 m) bgs. Samples were also collected for analysis of chemical COCs during the PDI at Plant 7S. Soil samples for arsenic and cadmium were collected and submitted for laboratory analysis during the PDI.

Remediation activities at Plant 7S took place between February 2005 and June 2005, with some additional remediation in March 2007. A total of approximately 3,630 in situ yd^3 (2,775 m^3) of contaminated materials were excavated from Plant 7S. In CY 2010, additional remediation activities were conducted at Plant 7S during the remediation of the BNSF Railroad VP (DT-12). One of the excavation areas identified at DT-12 was expanded into the adjacent Plant 7S. Soil excavation in this small area in Plant 7S began in July 2010 and was completed in November 2010 (USACE 2014b). It resulted in the removal of approximately 150 in situ yd^3 (115 m^3) of contaminated soil.

Post-remediation verification sampling at Plant 7S indicated that the concentrations of radiological and non-radiological COCs in the remediated areas met the RGs. The analytical results for the FSS samples indicated that the accessible soil at Plant 7S meets the criteria for unrestricted use. The PRAR-FSSE report for the accessible soil at Plant 7S is currently being developed and will be submitted as part of the PRAR-FSSE report for Plant 7 to the MDNR and the USEPA for review and comment prior to finalization.

Gunther Salt VP (DT-4)

DT-4 is the location of an active salt packaging, storage, and distribution facility. The DT-4 property is comprised of two tracts, designated the Gunther Salt North (GSN) and Gunther Salt South (GSS) parcels. The GSN parcel is occupied by storage and packaging buildings and is located on the southwestern corner of the intersection of Angelrodt and Hall Streets. The GSS parcel, located on the

southeast corner of the intersection of Hall and Buchanan Streets, is occupied by administrative offices and open storage areas.

Between 2000 and 2004, PDIs were conducted at the two DT-4 parcels to delineate the extent of radiological contamination prior to initiation of remedial activities. Two areas of radiological contamination were identified at GSN in the *Pre-Design Investigation Summary Report for Gunther Salt North at the FUSRAP St. Louis Downtown Site* (USACE 2005e). The areas were located in the south-central portion of the property and the north-central portion of the property. Three areas of radiological contamination were identified at GSS in the *Pre-Design Investigation Data Summary Report, Gunther Salt South Vicinity Property (DT-4 South*) (USACE 2005f). These areas were located in the north-central portion of the property and the northeastern and southeastern portions of the property.

Remedial activities consisting of the excavation of contaminated soils at DT-4 were conducted between April 2006 and August 2007. No unexpected events of note occurred during remedial activities at DT-4. A total of approximately 2,827 in situ yd^3 (2,161 m^3) of contaminated materials were excavated from DT-4 (382 in situ yd^3 [292 m^3] from GSS and 2,445 in situ yd^3 [1,869 m^3] from GSN).

Additional remediation was conducted at GSS between May 2010 and December 2011 to address a contaminated area located along the eastern property line adjacent to DT-12. Approximately 44 in situ yd^3 (33.6 m^3) of contaminated materials were excavated from GSS during this action.

The *Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Gunther Salt (DT-4)* (USACE 2012d) has been completed. The results of the post-remedial action risk assessment indicate that the concentrations of COCs remaining at the remediated areas meet the CERCLA target risk range of 10^{-6} to 10^{-4}. Both the analytical results and results of the post-remedial risk action assessment indicate that the accessible soil at DT-4 meets the criteria for unrestricted use.

Terminal Railroad Association VP (DT-9)

As currently defined by the USACE, DT-9 includes approximately 202,342 m^2 (50 acres) separated into several tracts. DT-9 consists of two main parcels of land: the narrow strip of land containing the railroad main lines running the entire length of the SLDS north and south along Hall Street (from Angelica Street in the far north to Dock Street on the south), and a second larger parcel of land, the rail yard area, located in the northeastern portion of the SLDS between Angelica Street and Bremen Avenue. Several additional parcels of the rail yard are located west of the railroad main line and west of DT-8, and two areas are located along the Mississippi River levee. The levee area of DT-9 is currently undeveloped, while the other smaller parcels are railroad side spurs and are used for loading and unloading of materials at DT-9 and DT-8. Much of the rail yard is leased by the Lange-Stegmann Fertilizer Company (Agrotain International LLC).

Between April 2007 and February 2008, PDI activities were conducted at DT-9 to delineate the extent of the radiological contamination prior to initiation of remedial activities. Based on the results of the PDI and previous investigations conducted at DT-9, seven areas of radiological contamination were identified. The results are documented in the *Pre-Design Investigation Summary Report, Terminal Railroad Association Vicinity Property (DT-9), FUSRAP St. Louis Downtown Site* (USACE 2010c).

Remedial activities consisting of the excavation of contaminated soils on DT-9 and the placement of backfill were conducted between February 3 and April 29, 2009. An estimated

2,440 in situ yd^3 (1,866 m^3) of contaminated soils were excavated from DT-9. The PRAR-FSSE report for the accessible soil at DT-9 is currently being developed and will be submitted to the MDNR and the USEPA for review and comment prior to finalization.

South of Angelrodt Properties (DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor)

The South of Angelrodt Properties include the AmerenUE VP (DT-5), Cash Scrap Metals Company VP (DT-13), Cotto-Waxo Company VP (DT-14), Star Bedding Company VP (DT-16), City of St. Louis Land Reutilization Authority (formerly owned by Curley Collins Recycling) VP (DT-18), and the Second Street Corridor between Dock Street and Angelrodt Street. These properties lie south of Angelrodt Street, north of Dock Street, east of North Broadway, and west of a major railroad corridor. A PDI was executed in 2006 on the South of Angelrodt Properties to collect data to be used in design or to confirm the properties meet the RGs as presented in the SLDS ROD. The analytical data indicated that no residual radioactivity above the RGs was present on these properties. An FSS was performed to verify that remediation was not required and that the accessible soil meets the criteria for unrestricted use. The results of the PDI and FSS are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor* (USACE 2010b).

Burlington Northern Santa Fe Railroad VP (DT-12)

The BNSF Railroad VP (DT-12) is made up of an approximately 20,234-m^2 (5-acre) portion of the BNSF tracks that traverse the SLDS in a north to south direction near the eastern edge of the SLDS from just south of Angelica Street to Dock Street. The property includes the railroad tracks and associated ROWs for several main lines, lead lines that split from the main lines, and spur lines.

From February to July 2009, characterization activities for a PDI were conducted at DT-12 to support the RD. The PDI sampling activities are described in the *Pre-Design Investigation Data Summary Report, Burlington Northern Santa Fe Railroad Vicinity Property (DT-12), FUSRAP St. Louis Downtown Site* (USACE 2010d). Based on the results from the PDI soil sampling activities, six areas were identified as containing radiological contamination. An additional area was added to the RD in July 2011 (USACE 2010d).

Remedial activities consisting of the excavation of radiologically contaminated accessible soils at DT-12 were conducted between May 3, 2010, and September 30, 2011 (USACE 2014b). An estimated 2,290 in situ yd^3 (1,751 m^3) of contaminated soils were excavated from DT-12. The *Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Burlington Northern Santa Fe Railroad (DT-12)* has been completed (USACE 2014b).

Kiesel Riverfront Property

The Kiesel Riverfront Property is located within the City of St. Louis. The Kiesel Riverfront Property is primarily comprised of the ROW along the Mississippi River, along with portions of parcels owned by the Kiesel Company and the City of St. Louis. The Kiesel Riverfront Property is bordered by the Mississippi River and parcels owned by the Kiesel Company and the City of St. Louis. Currently, the St. Louis Riverfront Trail is present on the west side of the property. The remainder of the property is undeveloped. In 2007, Chicago Bridge and Iron (CB&I) (formerly Shaw Environmental Inc.) characterized the Kiesel Riverfront Property with authorization from the USACE. Based on the results of the GWSs and biased and systematic soil sampling, the USACE

directed that CB&I complete PDI activities for the Kiesel Riverfront Property. The results of the PDI were documented in the *Pre-Design Investigation Data Summary Report, City Property Vicinity Property (DT-2), FUSRAP St. Louis Downtown Site, St. Louis, Missouri* (USACE 2009b). In summary, the PDI soil sample collection indicated that one area along the northern edge of the Kiesel Riverfront Property, just south of the adjacent DT-2 boundary, had radiological contamination. During remediation of DT-2, approximately 267 bank yd^3 (204 m^3) of contaminated soils were excavated from the portion of the SU that extended onto the Kiesel Riverfront Property. The period from excavation to restoration of the Kiesel Riverfront Property occurred from January 25, 2011, to March 30, 2011.

Mallinckrodt Plant 7 West

From January 18, 2000, through May 10, 2000, characterization activities for a PDI were conducted at Plant 7W to support the RD. These activities are described in the *Pre-Design Investigation Summary Report, Plants 6 West Half and 7W, FUSRAP St. Louis Downtown Site, St. Louis, Missouri* (IT 2001b). Additional PDI samples were collected at Plant 7W in December 2003.

Remedial activities consisting of the excavation of contaminated soils beneath and adjacent to the 700 Pad and a rail spur at the Plant 7W area were conducted between April 2011 and May 2012. The 700 Pad is the remaining foundation slab of the General Stores and Maintenance Shops built in 1951 to support the Destrehan Street Plant utilized for historical MED/AEC operations. The excavation area under the 700 Pad was approximately 12,500 ft^2 (1,161 m^2) (USACE 2011a). Approximately 10,150 in situ yd^3 (7,760 m^3) of contaminated materials were excavated from Plant 7W. Additional remedial activities are planned at Plant 7W. When the remedial action is complete, a PRAR-FSSE report for the accessible soil at Plant 7W will be developed and will be submitted as part of the PRAR-FSSE report for Plant 7 to the MDNR and the USEPA for review and comment prior to finalization.

Hjersted VP (DT-34)

DT-34 is located in the northeast corner of the SLDS and lies south of Bremen Avenue, east and north of the PSC Metals, Inc. VP (DT-8), and west of the BNSF Railroad VP (DT-12). A PDI was conducted at DT-34 in 2006 to define the extent of contamination on this property. The analytical data indicated that no residual radioactivity above the RGs was present on DT-34. An FSS was performed for the areas not requiring remediation to verify that remediation was not required and that the accessible soil meets the criteria for unrestricted use. The results of the PDI and FSS are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property DT-34* (USACE 2012e). A residual risk and dose assessment was performed to ensure that the final condition is consistent with the objectives of the selected remedy.

Kiesel Hall Street Property

The Kiesel Company Hall Street Property is located north of Branch Street, east of the TRRA Railroad lines, west of the BNSF Railroad lines, and south of Parcel 66103085. The Kiesel Hall Street Property also includes portions of adjacent parcels: the Gunther Salt property located at 44 Dock Street and the St. Louis City Property located at 5 Branch Street. Between September and October 2012, PDI activities were conducted at the Kiesel Hall Street Property to delineate the extent of the radiological contamination prior to initiation of remedial activities. The results of the investigation indicated radiological COCs were present on the property at concentrations exceeding the SLDS ROD RGs. Results of the investigation are presented in

Pre-Design Investigation Summary Report, Kiesel Hall Street Property, FUSRAP St. Louis Downtown Site (USACE 2013b). Remediation activities at the property were initiated in May 2013 and were ongoing at the end of the review period (December 2013). A PRAR-FSSE report for the accessible soil at the Kiesel Hall Street Property will be developed and will be submitted to the MDNR and the USEPA for review and comment prior to finalization.

Lange-Stegmann VP (DT-37)

The Lange-Stegmann VP (DT-37) is leased by Lange-Stegmann from the Angelica Riverfront Redevelopment Corporation. It is located north of Bremen Avenue, west of Wharf Street, and southeast of DT-9. A PDI was conducted at DT-37 in 2013 to collect data to be used in design or to confirm the property meets the RGs established in the SLDS ROD. PDI analytical data indicated no residual radioactivity above the RGs was present on DT-37 and no excavation/remediation was required on the property. An FSSE was conducted to verify that the accessible soil meets the criteria for unrestricted use. The results of the PDI and FSS are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Downtown Site Vicinity Property Lange-Stegmann (DT-37)* (USACE 2013a).

General Remediation Matters

As stated previously, authority under the SLDS ROD (USACE 1998a) for the remediation of MED/AEC-related wastes is limited to those wastes in accessible soil and ground water. The SLDS ROD defines accessible soil as soil that is not beneath buildings or other permanent structures. The SLDS ROD also provides examples of soil considered to be inaccessible and excluded from remedial action under the SLDS ROD. Soil that is inaccessible due to the presence of buildings, active roads, active rail lines, and the levee is specifically excluded from remediation. Because the scope of the remedial action authorized by the SLDS ROD is limited to accessible soil and ground water, the definition of accessible soil controls the determination of whether remediation of a particular area is authorized. The discussion of inaccessible soil in the SLDS ROD provides examples of areas excluded, but not a complete list. Therefore, the determination of whether an area is accessible or inaccessible is made on a case-by-case basis by applying the SLDS ROD definition of accessible soil. Because the determination of whether soil is accessible is directly related to the permanent nature of structures built upon soil, the USACE has concluded that areas surrounding buildings or other permanent structures where the volume of soil underlying the areas is required for structural stability of the adjacent building or other permanent structures are also inaccessible. Each area excluded from remediation as inaccessible is documented in the appropriate PRAR-FSSE report, will be included in the final site closeout report, and will be submitted to the MDNR and the USEPA for review and comment prior to finalization. Separate RODs will be developed for inaccessible areas at the SLDS. The MDNR and the USEPA will participate in this process.

The SLDS remedy also includes implementation of a long-term ground-water monitoring strategy for the Mississippi Alluvial Aquifer (HU-B). If long-term monitoring of HU-B shows that COCs are significantly exceeding the SLDS-ROD-specified ILs or the thresholds established in 40 *CFR* 192, then a GRAAA is to be initiated. The SLDS-ROD-specified ILs for each of the ground-water COCs are 50 micrograms per liter (µg/L) for arsenic, 5 µg/L for cadmium, and 20 µg/L for total U. Samples from three HU-B monitoring wells exceeded the ILs for one or more of the COCs established in the SLDS ROD. Phase 1 of the GRAAA was initiated in 2001 in response to significant exceedances of the total U IL in DW19 for an extended period (USACE 2003c). Phase 1 of the GRAAA summarized the ground-water sampling data and recommended further investigation of HU-B. Phase 2 of the GRAAA will be developed following

completion of remedial activities at Plant 6WH to assess the fate and transport of MED/AEC residual contaminants in ground water at the SLDS.

FSSs compatible with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (DOD 2000) are performed subsequent to remediation at the SLDS. These surveys document achievement of remedial goals. Results of FSSs are documented in PRARs for properties requiring remediation and in FSSE reports for those properties not requiring remedial action. Each of these reports includes a summary of the detailed documentation that confirms that the areas involved achieve RGs. This documentation specifically includes residual concentrations of COCs (e.g., exposure point concentrations [EPCs]) and assessment of residual site risks to confirm protectiveness.

System Operation/Operations and Maintenance

Thus far, the remedial activities completed for accessible soils have met the criteria for unrestricted use at certain properties. Therefore, no operations and maintenance (O&M) documents have been required. The USACE is currently in the process of developing the CERCLA documentation necessary to address inaccessible soil at the SLDS. The MDNR and the USEPA will be invited to participate in this process.

The O&M activities conducted during this five-year review period at the SLDS include annual well inspections and maintenance of access controls, as necessary.

O&M documents describe the ongoing measures taken at a site to ensure the remedy remains protective. O&M documents for the SLDS include the GRAAA. The phases of the GRAAA consist of assessment (Phase 1), investigation (Phase 2), feasibility (Phase 3), and proposed remediation (Phase 4). Phase 1 of the GRAAA was completed in 2003 (USACE 2003c). Based on the results of the Phase 1 GRAAA and the continued exceedance of the ILs for arsenic and total U in the HU-B ground-water samples, proceeding with Phase 2 of the GRAAA is necessary. Phase 2 of the GRAAA has not yet been initiated because remediation activities at Plant 6WH have not been completed. Potential sources of the elevated COC concentrations detected in HU-B ground water, such as contaminated soil located beneath Building 101, are being addressed by the ongoing remediation at Plant 6WH. Phase 2 will be initiated following completion of remedial activities at Plant 6WH in order to assess if the source removal results in a decrease in the COC concentrations in HU-B ground water. Phase 2 of the GRAAA will be discussed in a subsequent five-year review report.

NORTH ST. LOUIS COUNTY SITES

Response actions have been conducted at the North St. Louis County Sites in accordance with the CERCLA. CERCLA response actions may include removal actions and remedial actions. Removal actions address environmental contamination that requires remediation prior to a record of decision (ROD) and that requires short-term planning to address relatively immediate risks or threats. Remedial actions address contamination after the ROD is issued and generally apply to larger projects that require more planning. Prior to September 2005, North St. Louis County Sites removal actions were conducted pursuant to engineering evaluation/cost analyses (EE/CAs) and their corresponding action memoranda. A summary of the removal actions conducted at the North St. Louis County Sites is presented in the Second Five-Year Review Report (USACE 2010a). Remedial actions were conducted at the North St. Louis County Sites during the period of this review (January 2009 through December 2013).

North St. Louis County Sites Remedial Action Selection

The NC ROD (USACE 2005a) was signed on August 3, 2005, by Robert Crear, Brigadier General, Commander of the Mississippi Valley Division, USACE, and on September 2, 2005, by Celia Tapia, Director of Superfund Division, USEPA Region 7. As previously noted, prior to the NC ROD signature date, response actions at the North St. Louis County Sites were conducted as removal actions under the EE/CAs and action memoranda. From October 2005 to December 2013, a CERCLA remedial action was conducted at the North St. Louis County Sites in accordance with the NC ROD. The remedial action is ongoing at the North St. Louis County Sites.

The selected remedy for the North St. Louis County Sites is excavation, with institutional controls for soils under roads, railroad lines, and other permanent structures. Although further field and analytical work may be required as part of PDIs and the RD process to refine these areas of inaccessible soil, the following properties are associated with inaccessible soil requiring use restrictions.

- Inaccessible Soil under Buildings:
  - Futura
- Inaccessible Soil under Roads:
  - Latty Avenue
  - Byassee Road
  - Eva Road
  - Frost Avenue
  - McDonnell Boulevard
  - Banshee Road
  - Pershall Road
  - I-270 ROW
- Inaccessible Soil under Railroad Lines:
  - VP-40A – Railroad
  - IA-12
  - Norfolk Southern Railroad
  - VP-02(C) – Railroad
  - VP-04(C) – Railroad

The main components of the selected remedy, as set forth in the NC ROD (USACE 2005a), include:

- Excavate all accessible contaminated soils to RGs that support unlimited use and unrestricted exposure (UUUE) and dispose off-site at a permitted facility;
- Impose use restrictions at areas under roads, active rail lines and other permanent structures where the residual condition is not consistent with UUUE;
- Dredge contaminated sediments from Coldwater Creek to RGs that support UUUE;
- Remove contaminated soils from the surfaces of buildings and structures as necessary to achieve RGs that support UUUE, or remove the contaminated structures themselves and dispose off-site at a permitted facility;
- Monitor ground water and surface water during the soil remediation period to ensure water quality is not adversely effected and identify any areas where ground water may be significantly degraded; and,

- Monitor ground water long-term in selected areas where soils contaminated above the RGs are left in place or where contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

The RAOs for the North St. Louis County Sites, as set forth in the NC ROD (USACE 2005a), are to:

1. Prevent exposure to contaminated soils at concentrations which exceed chemical-specific ARARs or which result in an excess lifetime cancer risk [CR] greater than the acceptable risk range (greater than one in ten thousand) or which result in a Hazard Index (HI) greater than 1. The potential exposure pathways are direct contact, ingestion, inhalation of dust, and external gamma.
2. Prevent exposure to contaminated structural surfaces at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. Buildings and structures are contaminated primarily as a result of contaminated soils adhering to or becoming embedded in surfaces. The potential exposure pathways are external gamma, ingestion, and inhalation.
3. Prevent exposure to contaminated sediments in Coldwater Creek at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. The potential exposure pathways are direct contact, ingestion, and external gamma.
4. Remove the potential for ongoing migration of soil contaminants to the shallow ground-water system (HZ-A) and Coldwater Creek. Accomplishing this objective would also preclude the potential for future impacts to the deep ground-water systems (HZ-C, HZ-D, and the usable ground-water resource HZ-E).

The RGs for the radiological and non-radiological COCs at the North St. Louis County Sites, as set forth in the NC ROD (USACE 2005a), are presented in Table IV-3. The principal COCs are radionuclides associated with the residues from MED/AEC processes. Further discussion of the RGs for the radiological COCs is provided in this section.

Table IV-3. Remediation Goals for the North St. Louis County Sites

Media	SLAPS (Includes IA-01 to IA-07)		Latty Avenue Properties		SLAPS VPs (excluding CWC below mean water gradient)		CWC (below mean water gradient)	
	COC	**RG**	**COC**	**RG**	**COC**	**RG**	**COC**	**RG**
Surface Soil (less than or equal to 6 inches [15 cm])	***Non-Radiological (mg/kg)***							
	Antimony	15	Antimony*	15	Antimony**	15	NA	
	Arsenic	36	Arsenic*	36	Arsenic**	36		
	Barium	2,800	Barium*	2,800	Barium**	2,800		
	Cadmium	12	Cadmium*	12	Cadmium**	12		
	Chromium	350	Molybdenum*	1,000	Chromium**	350		
	Molybdenum	1,000	Nickel*	1,500	Molybdenum**	1,000		
	Nickel	1,500	Selenium*	300	Nickel**	1,500		
	Selenium	300	Thallium*	25	Selenium**	300		
	Thallium	25	Vanadium*	112	Thallium**	25		
	Uranium	150			Uranium**	150		
	Vanadium	112			Vanadium**	112		
	Radiological (pCi/g)							
	Ra-226[a]	5	Ra-226[1]	5	Ra-226[1]	5	NA	
	Th-230[b]	14	Th-230[2]	14	Th-230[2]	14		
	U-238[c]	50	U-238[3]	50	U-238[3]	50		

Table IV-3. Remediation Goals for the North St. Louis County Sites (Continued)

Media	SLAPS (Includes IA-01 to IA-07)		Latty Avenue Properties		SLAPS VPs (excluding CWC below mean water gradient)		CWC (below mean water gradient)	
	COC	**RG**	**COC**	**RG**	**COC**	**RG**	**COC**	**RG**
Subsurface Soil (greater than 6 inches [15 cm])	***Non-Radiological (mg/kg)***							
	Antimony	25	Antimony*	25	Antimony**	25	**NA**	
	Arsenic	40	Arsenic*	40	Arsenic**	40		
	Thallium	30	Thallium*	30	Thallium**	30		
	Uranium	150			Uranium**	150		
	Radiological (pCi/g)							
	Ra-226[a]	15	Ra-226[a]	15	Ra-226[a]	15	**NA**	
	Th-230[b]	15	Th-230[b]	15	Th-230[b]	15		
	U-238[c]	50	U-238[c]	50	U-238[c]	50		
Soil on Structures (e.g., Buildings)	***Radiological (disintegrations per minute per 100 square centimeters [dpm/100 cm^2])***							
	Actinium (Ac)-227	400	Ac-227	400	Ac-227	400	NA	
	Protactinium (Pa)-231	1,400	Pa-231	1,400	Pa-231	1,400		
	Ra-226	15,000	Ra-226	15,000	Ra-226	15,000		
	Ra-228	7,700	Ra-228	7,700	Ra-228	7,700		
	Th-228	4,400	Th-228	4,400	Th-228	4,400		
	Th-230	6,900	Th-230	6,900	Th-230	6,900		
	Th-232	1,300	Th-232	1,300	Th-232	1,300		
	U-234	17,000	U-234	17,000	U-234	17,000		
	U-235	16,000	U-235	16,000	U-235	16,000		
	U-238	19,000	U-238	19,000	U-238	19,000		
Sediment	***Radiological (pCi/g)***							
	NA		NA		NA		Ra-226[a]	15
							Th-230[b]	43
							U-238[c]	150
Ground Water	None		None		None		NA	
Surface Water	NA		NA		NA		None	

* Applies only to the HISS, Futura, VP-02(L), and Parcel 10K530087. Does not apply to Latty Avenue VPs 01(L), 03(L), 04(L), 05(L), and 06(L).

** Applies only to IA-08 through IA-13 (Figure IV-2).

[a] Lead (Pb)-210 is assumed to be present in equilibrium with Ra-226.

[b] Th-232 is co-located with Th-230 and is present at relatively low concentrations. Remediation of Th-230 will effectively remove Th-232 from the soils.

[c] U-238 was used as a surrogate for U-234, U-235, Pa-231, and Ac-227.

Notes:

NA – Not Applicable

Soil in the surface 6-inch (15-cm) layer will be removed if the radionuclide concentrations averaged over any area of 100 m^2 exceed:

- 5 pCi/g of Ra-226 above background, or
- 14 pCi/g of Th-230 above background, or
- 50 pCi/g of U-238 above background.

Subsurface soil (soil deeper than 6 inches [15 cm]) will be removed where the subsurface radionuclide concentrations averaged over any area of 100 m^2 and averaged over a 6-inch- (15-cm)-thick layer of soil exceed:

- 15 pCi/g of Ra-226 above background, or
- 15 pCi/g of Th-230 above background, or
- 50 pCi/g of U-238 above background.

Sediment below the mean water gradient will be removed if radionuclide concentrations averaged over any area of 100 m^2 exceed:

- 15 pCi/g of Ra-226 above background, or
- 43 pCi/g of Th-230 above background, or
- 150 pCi/g of U-238 above background.

The following SOR approach is used when more than one radionuclide is present.

$$SOR_{surface} = \frac{^{226}Ra_N}{5\,pCi/g} + \frac{^{230}Th_N}{14\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \leq 1$$

$$SOR_{subsurface} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{15\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \leq 1$$

$$SOR_{sediment} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{43\,pCi/g} + \frac{^{238}U_N}{150\,pCi/g} \leq 1$$

The "N" in the formulas listed previously stands for the net (above background) value. Mean soil background concentrations for the North St. Louis County Sites have been determined to be:

	Surface Soil	Subsurface Soil
Ra-226	0.95 pCi/g	1.15 pCi/g
Th-230	1.49 pCi/g	1.83 pCi/g
U-238	1.08 pCi/g	1.27 pCi/g

The surface and subsurface soil criteria in 40 *CFR* 192, Subpart B, for Ra-226 are 5 and 15 pCi/g, respectively, as an areal average concentration above background in the top 6-inch (15-cm) layer and in subsequent 6-inch (15-cm) layers, respectively. The USEPA's guidance documents for the cleanup of CERCLA sites using 40 *CFR* 192 as ARAR set forth the USEPA's expectation that remediation of subsurface soil contamination will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. Results of excavations performed at the North St. Louis County Sites indicate that residual concentrations of radium generally average less than the 5 pCi/g surface criteria and commonly are not significantly above background. The results also demonstrate that implementation of the subsurface remediation criterion of 15 pCi/g for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g.

The Th-230 surface and subsurface RGs established in the NC ROD are also consistent with a residual Ra-226 concentration of 5 pCi/g. A soil concentration of 14 pCi/g of Th-230 would result in the in-growth of 5 pCi/g Ra-226 concentration at the end of the 1,000-year time period stated in 40 *CFR* 192.02(a). Therefore, use of the unity rule, along with constraining the concentration of Th-230 in surface soil to 14 pCi/g and of subsurface soil to 15 pCi/g, assures that the concentration of Ra-226 does not exceed 5 pCi/g during the 1,000-year time period. Based on post-remediation data from various properties at the SLAPS and SLAPS VPs, these RGs achieve doses that are less than 12 mrem/yr in practice. In addition, risk assessments performed to date have determined that the RGs would achieve protectiveness to levels within the CERCLA risk range and below an HI of 1.

Confirmation that the requirements of 40 *CFR* 192 Subpart B have been met is provided in Appendix C, which contains summary tables of the FSS data for the SLAPS and SLAPS VPs for which remediation activities have been completed during this review period. The FSS data

confirm that soil left in place at the North St. Louis County Sites meets the criteria for UUUE in accordance with the NC ROD RGs.

For ground water, the NC ROD identifies two types of monitoring guidelines: (1) response-action monitoring guidelines and (2) a total-U monitoring guide (which is used for both response-action and long-term monitoring). The NC ROD guideline for response-action monitoring is two times the 95 percent upper confidence limit (UCL_{95}) of the mean, based on historical concentrations of the analyte in a particular well before remedial actions were initiated under the NC ROD. The total-U monitoring guide is defined in the NC ROD to be equal to the total-U maximum contaminant level (MCL) of 30 µg/L (USACE 2005a).

Response-action monitoring is conducted to assure that the remedial action does not significantly degrade ground-water conditions. A significantly degraded ground-water condition requires all of the following:

- that soil COC concentrations have statistically increased in ground water (relative to the well's historic data and accounting for uncertainty) for more than a 12-month period. Significantly increased concentrations are defined as doubling of an individual COC concentration above the UCL_{95} of the mean (based on the historical concentration before RA) for a period of 12 months;
- that the degraded well is close enough to impact CWC; and
- that a significant degrading of CWC surface water is anticipated.

Long-term monitoring of ground water (HZ-A only) will be conducted for inaccessible areas where contaminants remain at levels above the RGs (e.g., at the Futura buildings and McDonnell Boulevard) to assure protectiveness of the final remedy and to verify that ground-water conditions do not degrade. If ground-water monitoring indicates the presence of soil COCs at significantly increased concentrations and total U significantly above 30 µg/L, and it is determined that significant degrading of CWC surface water may occur, an evaluation of potential response actions would be conducted.

For the remedy for CWC, the NC ROD differentiates soil from sediment at the mean water gradient of CWC. The mean water gradient is a hydrologic term that refers to the low average water level and reflects the level of the creek that stays damp throughout most of the year. For material located above the mean water gradient, the soil RGs apply. Sediment RGs apply to material below the mean water gradient. To assure achievement of a protectiveness standard consistent with those defined in 40 *CFR* 192 for soil in unrestricted areas, sediment will be remediated for RGs equating to 15 pCi/g of Ra-226. The RGs derived for sediment are 15 pCi/g of Ra-226, 43 pCi/g of Th-230, and 150 pCi/g of U-238 as an areal average of 100 m^2.

Contamination under the mean water gradient occurs as relatively small volumes of contamination typically located in intermittent areas such as creek bends where natural settling would occur. These RGs recognize that sediments are subject to both mixing with non-contaminated sediments and being spread out if excavated. As such, use of these RGs reasonably assumes that sediments placed on the surface of areas adjacent to the creek achieve protectiveness standards that are as stringent as those applied to surface soil and meet the criteria for UUUE.

Use restrictions and land use controls will be maintained until the concentrations of hazardous substances in the soil are at such levels to allow for UUUE. The areas needing use restrictions and land use controls are limited to the areas described as "inaccessible," meaning that the areas are located under roads, active rail lines and other permanent structures. The RD process

involves field and analytical work to further refine the descriptions of the specific locations requiring use restriction.

The USACE is responsible for implementing, maintaining, reporting on, and enforcing the institutional controls until 2 years after site closeout in accordance with USEPA guidance on closeout procedures for NPL sites. At that time, these responsibilities will be transferred to the DOE as agreed to under the Memorandum of Understanding (MOU) between the USACE and the DOE, dated March 17, 1999 (DOE and USACE 1999).

North St. Louis County Sites Response Action Implementation

As part of the response actions for the North St. Louis County Sites, PDIs were conducted on the various North St. Louis County Sites properties in order to obtain the information necessary to develop the RD documents.

The PDIs conducted to date have either refined information obtained during the remedial investigation (RI) and/or provided new information regarding the degree and extent of contamination on the North St. Louis County Sites.

The ground-water monitoring is to assure that the environment is not being degraded by the sites' response actions. The monitoring also provides information to determine issues that may influence the management/disposition of excavation water.

Surface-water and sediment samples are collected from fixed locations along CWC on a scheduled, periodic basis. Sample data are analyzed and evaluated against water quality criteria as part of the SLS environmental monitoring program.

The remediation activities planned for each property are described in an RAWD. An RD is developed for each property based on the results of the PDI and existing site conditions. Soil having elevated radiological activity is excavated in accordance with the RD. GWSs and soil sampling are performed to guide excavation by identifying locations of contaminated soil, and to identify when the RGs have been met. If the analytical results from samples collected from excavated areas indicate that the RGs have not been met, then additional excavation, GWSs, and re-sampling, if required, are performed. This sequence is repeated until the concentration-based RGs are met.

This section details the history of the response action implementation at the North St. Louis County Sites. Information regarding initial plans, implementation history, removal measures (including monitoring, fencing, and institutional controls), and current status of the response actions is included. Also presented are discussions regarding any changes to or problems with response action components.

Latty Avenue Properties

Remedial actions were performed at the following Latty Avenue Properties and related VPs during the period of this review: the HISS, Futura, VP-01(L) Buildings, VP-02(L), and VP-40A (partial). Start and completion dates, as well as excavated (in situ) volumes of the Latty Avenue Properties response actions, are summarized in Table IV-4 in chronological order. Shaded properties are those for which remedial actions were conducted during this five-year review period (January 2009 through December 2013). The remediation status of the Latty Avenue Properties at the end of the review period (December 2013) is shown on Figure IV-3.

Table IV-4. Summary of Response Actions Conducted at the Latty Avenue Properties

Designation	Start	Complete	Volume Removed (yd^3)
HISS Removal Action (Stockpile Removal)	November 1999	October 2001	39,485
VP-02(L)	March 2000	August 2011	15,434
VP-01(L) and Parcel 10K530087	January 2007	January 2008	11,017
VP-40A (partial)	March 2007	November 2011	29,714
HISS Remedial Action (In Situ Soil)	January 2008	October 2011	53,800
Futura (Soil)	January 2008	October 2011	20,950
VPs 03(L) through 06(L)	February 2008	March 2008	3
Futura (Buildings)	April 2012	January 2013	103,560[a]
VP-01(L) Interior of Buildings	March 2013	August 2013	83

[a] Waste materials and construction debris (including pavement, utilities, and miscellaneous debris).

Note:

Shaded properties are those for which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

A description of the removal actions and remedial actions conducted at each property follows.

HISS and Futura

Removal actions, consisting of construction of a railroad spur line and loading facility and the removal of stockpiles, were conducted by the USACE between 1999 and 2001. The HISS stockpile removal was implemented pursuant to the *Engineering Evaluation/Cost Analysis (EE/CA) for the Hazelwood Interim Storage Site (HISS)* (HISS EE/CA) (USACE 1998b) and a corresponding action memorandum (USACE 1998c). A total of 39,485 in situ yd^3 (30,188 m^3) of material was removed from the HISS as part of the HISS stockpile removal action.

A remedial action under the NC ROD was initiated at the HISS and Futura in 2005. A PDI was conducted at the HISS and Futura to gather subsurface data to support the design of the remedial action. The PDI activities are described in the *Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura* (USACE 2006d). Based on the results of the PDI and previous investigations conducted at the HISS and Futura, several radiologically contaminated areas were identified throughout the properties. In addition, the interior and exterior surfaces of the HISS barn were determined to be impacted and radiological surveys were required. Comprehensive radiological surveys (i.e., scanning, fixed-point measurements, and sample collection) were performed to assess the status of the Futura buildings (USACE 2012f).

Remedial activities were initiated at the HISS in 2007. An earthen remediation containment stockpile structure and a haul road were constructed in 2007 to facilitate the remedial activities. Excavation activities at the HISS were initiated in January 2008. In 2011, the HISS rail spur was removed, then the contaminated soil underneath and adjacent to the rail spur was excavated, and the sanitary sewers at the HISS were removed and/or replaced. Between January 2008 and October 2011, approximately 53,800 in situ yd^3 (41,133 m^3) of materials were removed from the HISS as part of the remedial action.

The *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c) was issued on September 19, 2013. The results of the FSS indicate that concentrations of the radiological and non-radiological COCs do not exceed the RGs established in the NC ROD. FSS data confirm that the building surfaces of the HISS Barn meet the NC ROD RGs. The post-remedial action risk assessment indicates that concentrations of COCs remaining at the remediated areas meet the CERCLA target risk range of 10^{-6} to 10^{-4}. The results of the post-remedial action risk assessment (i.e., maximum residual risk and maximum residual dose) are provided in Table VI-33.

Excavation and backfill activities were conducted at Futura between January 2008 and March 2011, resulting in the removal of a total of approximately 20,950 in situ yd^3 (16,017 m^3) of contaminated soil. As part of a PDI, comprehensive radiological surveys (i.e., scanning, fixed-point measurements, and sample collection) were performed to assess the status of the Futura buildings. The results of the PDI are described in the *Addendum to the Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura – Building Interior and Exterior Data* (USACE 2012f). The *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Property Futura* (USACE 2014c) was issued on September 4, 2014. The results of the FSS indicate that concentrations of the radiological and non-radiological COCs do not exceed the RGs established in the NC ROD. Decontamination of select portions of the Futura Buildings 2/3 and 4 was performed by the USACE between April 2012 and January 2013. The remediation of the interior portions of Futura Building 2/3 resulted in the decontamination of interior horizontal surfaces and approximately 140 ft^2 (13 m^2) of vertical surface within approximately 15,000 ft^2 (1,393 m^2) of the manufacturing area. The remediation of Futura Building 4 resulted in the decontamination of approximately 80 linear ft (24.3 m) of subfloor concrete raceway and grates, two concrete grated inlets located in the dock ramps, and approximately 250 linear ft (76.2 m) of roof gutter along the exterior east eave. All decontamination activities were completed by January 30, 2013, and resulted in the removal of 103,560 yd^3 (79,177 m^3) of waste materials and construction debris, including pavement, utilities, and miscellaneous debris.

Indoor airborne radon monitoring is being conducted at the Futura buildings. During the period of this review, environmental monitoring was conducted at the site boundaries for radioactive air particulates, external gamma radiation, and radon levels. Indoor airborne radon monitoring is being conducted at the Futura buildings. A ground-water monitoring well network is used to sample and evaluate ground-water constituent concentrations and potential effects on ground-water quality.

Latty Avenue Vicinity Properties

The Latty Avenue VPs consist of eight properties located adjacent to the HISS and Futura: VP-01(L) through 06(L), VP-40A (partial), and Parcel 10K530087. Response actions were completed at VP-01(L) (with the exception of the interior of the buildings), Parcel 10K530087, and VP-03(L) through 06(L) prior to the period of this review (pre-January 2009). Remedial actions were conducted at the following Latty Avenue VPs during the period of this review (January 2009 through December 2013): VP-01(L) buildings, VP-02(L), and VP-40A (partial).

VP-01(L) and Parcel 10K530087

VP-01(L) and Parcel 10K530087 are located at 9151 and 9205 Latty Avenue, respectively. PDI sampling was conducted at VP-01(L) and Parcel 10K530087 in 2001 and 2003. In 2005, additional PDI sampling was conducted to address the areas where contamination was detected. The results are summarized in the *Pre-Design Investigation Summary Report for FUSRAP Coldwater Creek Vicinity Property 08(C) & Latty Avenue Vicinity Properties 01(L), & 40A East, & Parcel 10K530087* (USACE 2007b).

Remediation activities at VP-01(L) and Parcel 10K530087 were conducted between January 23, 2007, and January 17, 2008. An estimated 11,017 in situ yd^3 (8,423 m^3) of contaminated materials were removed from VP-01(L) and Parcel 10K530087. Verification data indicate that concentrations of the radiological and non-radiological COCs do not exceed the RGs at Parcel 10K530087. No non-radiological COCs exist for VP-01(L). The verification data for VP-01(L) indicate that concentrations of the radiological COCs in soil do not exceed the RGs. However, radiological contamination was identified in dust samples collected from the interior of

the Main Building and the Boiler House, and in dust and soil samples collected from the Meter House floor. The *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087* (USACE 2010e) has been completed.

Design of a remedial action to address contamination in the interior of buildings located at VP-01(L) was initiated in early CY 2013 and is documented in the *Vicinity Property 01(L) Building Interior Decontamination Plan* (USACE 2013d). The decontamination of the buildings was conducted between March 11, 2013, and August 19, 2013. The volume of contaminated materials (i.e., dust, sediment, personal protective equipment [PPE], and conveyor track system debris) removed during the decontamination of the buildings at VP-01(L) was 83 yd^3 (63.5 m^3). Radiological FSS data confirm that the building/structures on VP-01(L) meet NC ROD RGs.

VP-02(L)

VP-02(L) is located east of the former HISS piles at the western end of Latty Avenue. Results of an October 2000 radiological survey indicated that the roof of the building at VP-02(L) exhibited above-background levels of radiological contamination. Contamination was located between the older, bottom roof layer and the newer, surface roof layer. Building/Roof remediation activities were initiated at VP-02(L) in October 2001. The roof removal project included removal of the existing radiologically contaminated roof assembly and decontamination of roof areas, as necessary. The FSS of the roof decking and penetrations was completed in December 2002 and is documented in the *VP-2(L) Building Roof Remediation Final Status Survey Evaluation Report* (USACE 2005g).

In the second quarter of CY 2005, excavation activities were conducted at VP-02(L) in support of property-owner drainage improvements. Approximately 804 yd^3 (614.7 m^3) of soils were removed from an area located north of the building on VP-02(L). The soil was transported to the SLAPS for disposal.

A PDI was conducted at the property in CY 2007 to provide the information needed to support the RD. The results are summarized in the *Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L)* (USACE 2008a). Nine areas were identified that exceeded the NC ROD radiological RGs. No PDI samples exceeded the non-radiological RGs. Soil remediation activities at VP-02(L) were initiated in December 2009 and were completed in October 2010. The remediation activities included excavation of previously identified areas of contamination, backfilling of the excavation with approved borrow, and restoration of the soil surface. A total of 14,630 in situ yd^3 (11,185 m^3) of contaminated soils were excavated from the property. From January through March 2011, the USACE performed a PDI on the interior and exterior surfaces of the VP-02(L) building. The results of the investigation are summarized in the *Addendum to the Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L) – Building Interior and Exterior Data* (USACE 2012g). Remediation of the VP-02(L) building was initiated in May 2011 and completed in August 2011. Remediation of the building structure surfaces involved decontamination by sweeping, wiping, powerwashing, and vacuuming. The floor drains and sewer pipes were flushed with a high-pressure pipe cleaning system. The *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L)* has been completed (USACE 2012h). The results of the FSS indicate that drain and sewer pipe sediment sample concentrations of radiological and non-radiological COCs do not exceed the surface soil RGs (5 pCi/g for Ra-226, 14 pCi/g for Th-230, and 50 pCi/g for U-238) established in the NC ROD. Additionally, all drain and sewer pipe surface measurements for gross alpha and beta were less than the site-specific DCGL of 5,200 dpm/100 cm^2 and the American National Standards Institute (ANSI) guideline investigation level of 6,000 dpm/100 cm^2, respectively (ANSI 1999).

VP-03(L), VP-04(L), VP-05(L), and VP-06(L)

VPs 03(L), 04(L), and 05(L) are located on the south side of Latty Avenue. VP-06(L) is located south of VP-02(L), at the western end of Seeger Industrial Drive. Soil characterization work on VPs 03(L), 04(L), 05(L), and 06(L) was conducted between January 2001 and June 2002. One soil sampling location near the northern property boundary of VP-04(L) was identified as exhibiting radiological levels above the NC ROD RGs. PDI soil sampling was conducted between September 2004 and April 2005 to evaluate the extent of the impacted area. The results of the PDI sampling indicated that the area of radiological impact was of limited size on VP-04(L). No remedial activities were required on VPs 03(L), 05(L), or 06(L). A remedial action was conducted on VP-04(L) between February 18 and March 18, 2008. Three (3) in situ yd^3 (2.3 m^3) of contaminated materials were removed from VP-04(L). The *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 03(L), 04(L), 05(L) and 06(L)* has been completed (USACE 2012i). The results of the FSS indicate that concentrations of the radiological COCs do not exceed the RGs established in the NC ROD. No non-radiological COCs exist at these properties.

VP-40A (partial)

The majority of VP-40A is owned by Norfolk Southern Corporation and is used as a commercial railroad. Due to its use as a commercial railroad, VP-40A can be described as a property that winds through the commercial/industrial section of the North St. Louis County Sites and branches out at as the railroad tracks follow different paths, typically ending in railroad spurs on properties requiring railroad transportation for their goods. A portion of VP-40A owned by Norfolk Southern Corporation falls with the boundary of the Latty Avenue Properties as defined in the NC ROD (as shown on Figure III-5).The remainder of VP-40A is within the SLAPS VPs.

The portion of VP-40A within the boundary of the Latty Avenue Properties consists of a portion of the floodplain of CWC west and south of the HISS and Futura and the rail spurs that continue into a commercial/industrial section of the North St. Louis County Sites. VP-40A (partial) is generally bordered by Frost Avenue, CWC, and Pershall Road. A PDI for VP-40A (partial) was performed in 2003 and in 2006 (USACE 2007b). The goal of the investigation was to provide sufficient data for subsequent design, remediation, and demonstration that the entire property meets the criteria for unrestricted use. A remedial action was conducted at VP-40A Partial between March 2007 and November 2011. The USACE removed 29,714 in situ yd^3 (22,718 m^3) of contaminated materials from VP-40A (partial).

Portions of VP-40A (partial) met the NC ROD RGs and did not require remediation. The results of the PDI and FSSE for the portion of VP-40A that did not require remediation are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (Partial)* (USACE 2013e). This document also addresses portions of VP-40A that are within the SLAPS VPs. Additional evaluation and remediation of the remaining portion of VP-40A are planned.

SLAPS

All removal actions and remedial actions at the SLAPS were completed prior to this five-year review period (i.e., prior to January 2009). The response actions conducted at the SLAPS consisted of a nine-phased removal action and a single-phased remedial action. The SLAPS and the adjacent VPs were divided into investigation areas (IAs) based on areas of former material storage and other factors. The SLAPS IAs and work areas are shown on Figure IV-2.

CERCLA removal actions were conducted from December 1998 through September 2005 in nine work areas at the site in accordance with the *Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum* (SLAPS EE/CA and Action Memorandum) (USACE 1999a). The nine work areas included the East End Work Area, followed by the Radium Pits Work Area, the East End Extension and ROW Work Area, Phase 1 Work Area, Phases 2 and 3 Work Areas, Phases 4 and 5 Work Areas, and Phase 6 (EE/CA) Work Area. A CERCLA remedial action was conducted from October 2005 through January 2007 for the Phase 6 (NC ROD) Work Area in accordance with the NC ROD (USACE 2005a). Between September 1998 and January 2007, a total of 420,538 in situ yd^3 (321,524 m^3) of materials were removed from the SLAPS.

Some temporary buildings, utilities, and other structures, including a rail spur and loadout pad, at the SLAPS are used to facilitate remedial activities at other North St. Louis County Sites. No areas within the boundaries of the SLAPS fall under roads, active rail lines, or other permanent structures. Therefore, it was not necessary to impose use restrictions. A site perimeter fence was constructed along McDonnell Boulevard, outside the highway ROW.

The *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site, Includes Investigation Areas 01 Through 07, Investigation Area 08: South Ditch, Parts of Investigation Areas 11 and 12, and Coldwater Creek: West of IA-01* (SLAPS PRAR-FSSE) (USACE 2009c) was issued on May 14, 2009. This PRAR-FSSE report includes IAs 01 through 07; IA-08: South Ditch; parts of IA-11 and IA-12; and CWC: West of IA-01. The results of the FSS indicate that concentrations of the radiological and non-radiological COCs do not exceed the RGs established in the NC ROD. The post-remedial action risk assessment indicates that concentrations of COCs remaining at the remediated areas meet the CERCLA target risk range of 10^{-6} to 10^{-4}.

SLAPS VPs

Remedial actions were performed at the following SLAPS VPs during the period of this review: VPs 05, 06, 12, 31A, 38 (partial), 53, 54, 55, and 63, IA-09 Ballfields, IA-10 and CWC Area North of McDonnell Boulevard, McDonnell Boulevard East Section (b) ROW, the Hazelwood Avenue VPs, the Frost Avenue ROW adjacent to VP-21, VP-16, the Norfolk Southern/Eva Loadout Facility, and Banshee Road. The remedial actions at VP-04(C), VP-05(C), VP-08(C), and VP-38 (partial) are only partially completed. Start and completion dates, as well as excavated (in situ) volumes of soil from the SLAPS VPs response actions, are summarized in chronological order in Table IV-5. Shaded properties are those for which response actions were conducted during this five-year review period (January 2009 through December 2013). The completed properties that did not require remediation and for which the FSSE was completed prior to the end of this five-year review period (December 2013) are listed in Table IV-6. The remediation status of SLAPS VPs at the end of the review period (December 2013) is shown on Figure IV-3. The results of the post-remedial action risk assessments (i.e., maximum residual risk and maximum residual dose) for the completed properties are provided in Table VI-33.

Table IV-5. Summary of Response Actions Conducted at the SLAP and SLAPS VPs

Designation	Start	Complete	Volume Removed (yd^3)
The SLAPS	September 1998	January 2007	420,538
CWC VP - St. Denis Bridge Area Utility Support	November 1998	November 1998	193[a,b]
IA-12	June 1999	July 2008	16,719
VP-38 (partial)[c]	November 1999	June 2000	4,620 (Removal Action)
	February 2009	May 2009	1,440 (Remedial Action)
VP-24 (Removal Action)	May 2002	May 2002	95

Table IV-5. Summary of Response Actions Conducted at the SLAP and SLAPS VPs (Continued)

Designation	Start	Complete	Volume Removed (yd^3)
VP-04(C) and VP-05(C) (partial)[c]	March 2004	July 2004	71[b]
McDonnell Boulevard ROW Adjacent to VP-13	June 2004	July 2004	1,296
IA-09 Ballfields (Phases 1, 2, and 2B partial)	September 2005	September 2005	730[c]
VP-08(C) (partial)[c]	June 2007	October 2007	4,892 (Eastern Portion of Property)
IA-13	June 2008	September 2008	2,802
VP-08 and VP-09	June 2008	June 2008	252
Hazelwood Avenue VPs[d]	May 2009	March 2010	943
VP-63	March 2010	April 2010	70
VP-54	March 2010	April 2010	65
VP-55	April 2010	April 2010	228
VP-53	April 2010	June 2010	104
VP-05 and VP-06	May 2010	August 2010	42
VPs 10, 11, and 12	June 2010	May 2011	2,720[e]
IA-10 and CWC Area North of McDonnell Boulevard	2011[f]	In Progress	*
McDonnell Boulevard East Section (b) ROW	September 2010	March 2011	434
VP-31A	February 2011	May 2011	34
IA-09 Ballfields (Phases 1, 2, and 2B partial)[c]	November 2011	In Progress	*
Frost Avenue ROW Adjacent to VP-21	January 9, 2012	January 26, 2012	26 (soil) 33 (waste and construction debris)
VP-16	May 2013	June 2013	68[g]
Norfolk Southern/Eva Loadout Facility[c]	May 2013	In Progress	
Banshee Road	September 2013	September 2013	1

* Final volume removed is not available as the remedial action is in progress.

[a] Excavation was conducted in conjunction with replacement of the St. Denis Street Bridge.

[b] Excavation was conducted in conjunction with utility work.

[c] Remediation is not complete. Additional sampling is planned for these properties.

[d] Hazelwood Avenue VPs include Hazelwood Avenue, the Hazelwood Avenue ROW (partial) and VPs 32, 35, 35A, 36, 39, 40, 42, and 47.

[e] Soil volume represents the in-situ volume removed from VP-12 during this review period. An additional 35 in situ yd^3 (26.8 m^3) of contaminated materials were removed from VP-10 between October 30 and November 14, 2003.

[f] Additional remediation was conducted in 2011 in the CWC Area North of McDonnell Boulevard during remediation of an adjacent property, VP-12.

[g] Soil volume represents combined quantities from both VP-16 and an adjacent portion of the Norfolk Southern/Eva Loadout Facility.

Notes:

This table does not include completed properties for which remedial actions were not required.

Shaded properties are those for which remedial actions were conducted during this five-year review period (January 2009 through December 2013).

Table IV-6. SLAPS VPs: Completed Properties Not Requiring Remediation[a]

Designation	Documentation of Final Status Survey Evaluation Results
VP-27	*Final Status Survey Evaluation for the SLAPS Vicinity Property 27*, St. Louis, Missouri, Rev. 0, March 30, 2006 (USACE 2006e).
VPs 21, 22, 23, 24, 26, 28, 29, 30, and 31	*Pre-Design Investigation and Final Status Survey Evaluation for the SLAPS Vicinity Properties 21, 22, 23, 24, 26, 28, 29, 30 and 31, North St. Louis County Sites*, St. Louis, Missouri, Rev. 0, May 7, 2008. (USACE 2008b).
VPs 17, 18, 19, 20, 20A, and 25	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 17, 18, 19, 20, 20A, and 25*, St. Louis, Missouri, Rev. 0, August 12, 2009 (USACE 2009d).

Table IV-6. SLAPS VPs: Completed Properties Not Requiring Remediation[a] (Continued)

Designation	Documentation of Final Status Survey Evaluation Results
VPs 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51, and 52	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51 and 52,* St. Louis, Missouri, Rev. 0, September 18, 2009 (USACE 2009e).
VPs 33, 34, and 37	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 33, 34, and 37,* St. Louis, Missouri, Rev. 0, September 23, 2010 (USACE 2010f).
VP-03 and VP-04	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 03 and 04,* St. Louis, Missouri, Rev. 0, June 24, 2011 (USACE 2011b).
VP-40A (partial)[b]	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (Partial),* St. Louis, Missouri, Rev. 0, August 13, 2013 (USACE 2013e).
VP-09(C) and VP-10(C)	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 09(C), 10(C), and the Road Right of Way (partial),* St. Louis, Missouri, Rev. 0, September 18, 2013 (USACE 2013f).
VPs 60, 61, and 62, and Parcels 09K130104A and 09K130104B	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 60, 61, and 62 and Parcels 09K130104A and 09K130104B,* St. Louis, Missouri, Rev. 0, July 30, 2013 (USACE 2013g).
VPs 01, 02, 07, 13, 14, 15 and IA-11(partial)	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 01, 02, 07, 13, 14, 15, and Investigation Area 11 (partial).* St. Louis, Missouri, Rev. 0, September 3, 2014 (USACE 2014d).

[a] Completed properties are those for which remedial actions were not required and the FSSE was completed prior to the end of this five-year review period (December 2013).

[b] Additional evaluation and remediation activities are planned for VP-40A

Note:

Shaded properties are those for which the final PDI-FSSE report was completed during this five-year review period (January 2009 through December 2013).

This section includes a description of the removal actions and remedial actions conducted at each VP. Those SLAPS VPs for which remedial actions were completed prior to the third five-year review period (i.e., pre-January 2009) are discussed in Section IV of the Second Five-Year Review Report (USACE 2010a) and are thus not further addressed herein. Those SLAPS VPs for which remedial activities were conducted during this third five-year review period (January 2009 through December 2013) are presented as follows, chronologically by start date.

SLAPS VPs - Remedial Actions Conducted During Third Five-Year Review Period

Remedial actions were performed at the following SLAPS VPs during the period of this review: VP-38 (partial); the Hazelwood Avenue VPs (Hazelwood Avenue, the Hazelwood Avenue ROW [partial], and VPs 32, 35, 35A, 36, 39, 40, 42, and 47); VPs 63, 54, 55, 53, 05, 06, and 12; IA-08, IA-10, and CWC Area North of McDonnell Boulevard, McDonnell Boulevard East Section B, VP-31A, IA-09 Ballfields (Phases 1, 2, and 2B partial), VP-16 and the Norfolk Southern/Eva Loadout Facility; and Banshee Road.

VP-38 (partial)

VP-38 is located at the northwest corner of Hazelwood Avenue and Latty Avenue in Berkeley, Missouri. A removal action was conducted on a portion of VP-38 during 1999 and 2000. Approximately 4,620 in situ yd^3 (3,532 m^3) of radiologically contaminated soils were removed. The VP-38 removal action is documented in the *Vicinity Property 38 Removal Action Summary* (USACE 2001).

PDI sampling was conducted from 2000 through 2002 and again in 2005 to define the extent of additional contamination requiring remediation and to provide data to be used for RD. One large area that exceeded NC ROD RGs was identified immediately east of the excavation completed in June 2000. A remedial action was conducted at VP-38 between February and May 2009, during which approximately 1,440 in situ yd^3 (1,101 m^3) of radiologically contaminated soils were removed. The remediated area included an unused grassy lot located on the southern portion of the property. Areas of contamination exceeding NC ROD remediation criteria remain in place along portions of the west side walls of the 2009 excavation and the periphery of the 2000 excavation. They were not remediated due to the proximity of the USACE FUSRAP trailer complex fence. Additional evaluation and possible future remediation of these areas may be required.

Hazelwood Avenue VPs (Hazelwood Avenue, the Hazelwood Avenue ROW [partial], and VPs 32, 35, 35A, 36, 39, 40, 42, and 47)

For the purposes of this report, the Hazelwood Avenue VPs include Hazelwood Avenue, the Hazelwood Avenue ROW (partial), and VPs 32, 35, 35A, 36, 39, 40, 42, and 47. These properties are generally located along Hazelwood Avenue between Frost Avenue and Pershall Road. Between 1986 and 1989, the DOE performed radiological soil characterization of the Hazelwood Avenue VPs. From 1996 to 1997, the DOE conducted removal actions on VPs 32, 35, 35A, 36, 39, 40, 42, and 47. The USACE started characterization of the Hazelwood Avenue VPs in 1999, and conducted PDI sampling in 2008 and 2009. The PDI is documented in the *Pre-Design Investigation Summary Report for the St. Louis Vicinity Property Right of Way Adjacent to Hazelwood Avenue* (USACE 2009f).

Based on the results of the investigation, a remedial action was initiated on May 4, 2009, for the areas of radiological contamination identified on the Hazelwood Avenue ROW (partial), VP-39, and VP-40. Approximately 943 in situ yd^3 (721 m^3) of radiologically contaminated soils were removed. The remedial action was completed on March 11, 2010. Results of the PDI and the FSS indicate that no remediation is required at the remaining Hazelwood Avenue VPs. The *Post-Remedial Action Report and Final Status Survey Evaluation for Hazelwood Avenue, the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 32, 35, 35A, 36, 39, 40, 42 and 47* has been completed (USACE 2010g). The FSS data have confirmed that no soils have been left in place at the Hazelwood Avenue VPs with contamination above the NC ROD RGs.

VP-63

VP-63 (also known as the Old Ford Plant) is located east of Lindbergh Boulevard and Pershall Road and south of Ford Lane in Hazelwood, Missouri. Numerous site characterization activities have been conducted on VP-63. The USACE conducted characterization soil sampling on VP-63 in 2004, 2005, 2007, and 2008. The PDI soil sampling was conducted at VP-63 in 2008 and 2009 and is documented in the *Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Property 63* (USACE 2009g). The remedial action was conducted from March 10 to April 15, 2010, resulting in the removal of an estimated 70 in situ yd^3 (53.5 m^3) of radiologically contaminated soil from the portion of the Lindbergh Boulevard ROW adjacent to VP-63. The *Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 63* has been completed (USACE 2011c).

VP-54

VP-54 is located immediately south of Pershall Road, west of the intersection of Pershall Road and Hazelwood Avenue. The USACE conducted characterization soil sampling on VP-54 in

2002, 2004, and 2005. A PDI was performed in 2008 to further define the extent of contamination at VP-54. The PDI results are documented in the *Pre-Design Investigation Summary Report for the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 53, 54, and 55* (USACE 2009h). A remedial action was conducted from March 24 to April 21, 2010, and resulted in the removal of approximately 65 in situ yd^3 (49.7 m^3) of radiologically-contaminated soil. Site restoration was completed by April 28, 2010. The *Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 54* has been completed (USACE 2011d).

VP-55

VP-55 is located immediately south of Pershall Road and west of VP-54. Between 1986 and 1989, the DOE performed radiological soil characterization of VP-55. The USACE conducted characterization activities of VP-55 in 2002 and 2004, and a PDI was performed in 2008 and 2009 to further define the extent of contamination. The PDI results are documented in the *Pre-Design Investigation Summary Report for the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 53, 54, and 55* (USACE 2009h). A remedial action was conducted in April 2010, resulting in the removal of an estimated 228 in situ yd^3 (174.3 m^3) of radiologically-contaminated soil from VP-55. The *Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 55* has been completed (USACE 2011e). The FSS data have confirmed that no soils have been left in place at VP-55 with contamination above the NC ROD RGs.

VP-53

VP-53 is located at the intersection of Hazelwood Avenue and Pershall Road, bordered by VP-47 to the south and VP-54 to the west. The property is privately owned, and Central Pattern Company is the business currently residing on the property. Between 1986 and 1989, and again in 1996, the DOE performed a radiological soil characterization of VP-53. In 1997, the DOE conducted a removal action on VP-53. The USACE started characterization of VP-53 in 2002, and a PDI was performed in 2008 to further define the extent of contamination (USACE 2009h). A remedial action was conducted between April 28 and June 21, 2010. Approximately 104 in situ yd^3 (79.5 m^3) of soils were excavated from VP-53 and shipped via rail to a properly licensed, out-of-state disposal facility in 2010. The *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 53* has been completed (USACE 2011f). The FSS data have confirmed that no soils have been left in place at VP-53 with contamination above the NC ROD RGs.

VP-03 and VP-04

VP-03 and VP-04 are located at the northeast corner of the intersection of McDonnell Boulevard and Lindbergh Boulevard. A PDI was conducted in 2009. Results of the PDI and the FSSE at VP-03 and VP-04 indicate that no remediation was required at these two properties. The results are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 03 and 04* (USACE 2011b).

VP-05 and VP-06

VP-05 and VP-06 are located northeast of the intersection of McDonnell Boulevard and Lindbergh Boulevard. The USACE performed characterization sampling from 2003 to 2005, and a PDI was conducted in 2009 to define the extent of contamination on these properties. The results of the PDI are documented in the *Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Properties 03, 04, 05, and 06* (USACE 2009i). Based on the

results of the PDI, remediation was initiated on May 17, 2010, for the areas of radiological contamination identified on VP-05 and VP-06. Approximately 42 in situ yd^3 (32 m^3) of soils were excavated from VP-05 and VP-06. Excavation and restoration activities were completed on August 5, 2010. The *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 05 and 06* has been completed (USACE 2011g). The results confirm that no soils have been left in place at VP-05 or VP-06 with contamination above the NC ROD RGs.

VP-10, VP-11, and VP-12

VPs 10, 11, and 12 are located at the intersection of McDonnell Boulevard and Byassee Drive in Hazelwood, Missouri. Between 1986 and 1989, the DOE performed soil characterization activities on VPs 10, 11, and 12. In 1999 and 2000, and again in 2003, the USACE performed characterization activities (including soil sampling and GWSs) on VPs 10, 11, and 12. In 2009, soil sampling on VP-10 and VP-11 was conducted at the request of the property owner to verify that site soils met RGs because of a potential buyer for the property. A PDI was conducted in 2009 to fill any data gaps necessary to plan RD. The results of the PDI are documented in the *Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Properties 9, 10, 11, and 12, Investigation Area 9 Ballfield Hotspot, and Investigation Area 10 Hotspot* (USACE 2009d).

Approximately 2,720 in situ yd^3 (2,080 m^3) of soils were excavated from VP-12 as a result of the remedial action performed in accordance with the NC ROD. The *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 10, 11, and 12* has been completed (USACE 2013h).

IA-10 and CWC Area North of McDonnell Boulevard

IA-10 is an area owned by the City of St. Louis that is located north of the IA-09 Ballfields and adjacent to CWC. In 1990, the DOE collected soil samples at IA-10 as part of the characterization of CWC. The USACE performed additional soil sampling in 2000 and in 2005 in order to further characterize the extent of soil contamination on IA-10. Additional samples were collected in 2010 and 2011 in the southwestern corner of IA-10 during the verification of the adjoining property. In 2011, the USACE remediated the portion of IA-10 adjacent to McDonnell Boulevard and CWC.

A PDI was conducted in 2012 and 2013 to further define the extent of soil contamination that exceeds NC ROD RGs and to collect additional characterization samples suitable for an FSS, in accordance with the *Pre-Design Investigation Work Plan, Coldwater Creek: Northwest of Investigation Area-09 and Investigation Area-10, St. Louis Airport Site Vicinity Properties, FUSRAP North St. Louis County Sites* (USACE 2012j). Results of the PDI indicate radiological and non-radiological contamination is present on IA-10. Additional evaluation and future remediation of this area are planned.

McDonnell Boulevard East Section (b) Right-of-Way

The McDonnell Boulevard East Section (b) ROW is located east of the SLAPS and west of Interstate (I)-170 between Genaire Drive to the south and Banshee Road to the north. Collection of soil data for the McDonnell Boulevard ROW began in 1986 and continued through 2005. Bechtel National Inc. (BNI), under the direction of the DOE, conducted initial soil sampling in the McDonnell Boulevard ROW between 1986 and 1989. Under USACE direction, PDI samples were collected in the McDonnell Boulevard ROW in 2002. The PDI is documented in the *Pre-Design Investigation Data Summary Report for the McDonnell Boulevard, East Section (b),*

Right-of-Way (USACE 2007c). The remedial action was conducted from September 4, 2010, to March 21, 2011. Approximately 434 in situ yd^3 (331.8 m^3) of soils were excavated from the McDonnell Boulevard ROW property and shipped via rail to a properly licensed, out-of-state disposal facility in 2011.

VP-31A

VP-31A is located in Berkeley, Missouri, and consists of two parcels owned by Sid Boedecker Safety Shoe Service Inc. VP-31A is bounded by the I-170 ROW to the south, I-170 to the east, Hazelwood Avenue to the west, and VP-33 to the north. A removal action was performed by the DOE on the southwest portion of VP-31A in 1997. This removal action is described in the *Post-Remedial Action Report for Remedial Actions Conducted in St. Louis, Missouri, During Calendar Year 1997* (DOE 1998).

In 2001 and 2002, characterization activities were conducted at VP-31A in an effort to further delineate the extent of radiological contamination. Activities included the performance of a GWS and the collection of biased soil samples. A PDI was conducted at VP-31A in 2008 to collect data to be used in the RD. The PDI of the portion of VP-31A that required excavation is documented in the *Pre-Design Investigation Summary Report for the Right-of-Way adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 53, 54, and 55* (USACE 2009h). The remedial action was conducted from February 10, 2011, to March 10, 2011. Approximately 34 in situ yd^3 (26 m^3) of soils were excavated from VP-31A and shipped via rail to a properly licensed, out-of-state disposal facility in 2011. The *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 31A* has been completed (USACE 2013i).

VP-40A (partial)

A portion of VP-40A falls with the boundary of the SLAPS VPs as defined in the NC ROD. In 2011, the USACE conducted PDI activities on VP-40A to address areas that were not fully investigated or not included within the *Pre-Design Investigation Summary Report for FUSRAP Coldwater Creek Vicinity Property 08(C) & Latty Avenue Vicinity Properties 01(L), & VP 40A East, & Parcel 10K530087* (USACE 2007b). As part of the 2011 PDI soil sampling, soil samples were collected on VP-40A to verify existing remediation boundaries and to vertically bound areas of known contamination. The results of the PDI indicated that 20 areas remained on VP-40A that do not meet NC ROD RGs. These areas were typically near the rail lines or in the triangle-shaped portion of VP-40A that lies east of VP-09(C) and VP-10(C).

Portions of VP-40A met the NC ROD RGs and did not require remediation. The results of the PDI and FSSE for the portion of VP-40A that did not require remediation are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (Partial)* (USACE 2013e). Additional evaluation and remediation of the remaining portion of VP-40A are planned.

VP-09(C) and VP-10(C)

VP-09(C) and VP-10(C) lie within the 100-year floodplain of CWC, less than 0.5 mile downstream from the SLAPS and just upstream of the HISS. A PDI was conducted in 2013 to define the extent of contamination on these properties. Results of the PDI and the FSS at VP-09(C) and VP-10(C) indicated that no remediation was required at these two properties. The results are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 09(C), 10(C), and the Road Right of Way (partial)* (USACE 2013f).

VP-60, VP-61, VP-62, and Parcels 09K130104A and 09K130104B

VPs 60, 61, and 62, and Parcels 09K120104A and 09K120104B are located southeast of Pershall Road and northeast of Ford Lane, in Hazelwood, Missouri. A PDI was conducted at these properties in 2003 and 2004 to collect additional analytical data to be used in the RD or to confirm the properties met the NC ROD RGs. As part of the PDI, the structures (i.e., buildings and communication towers) were determined to be non-impacted. In December 2012 and January 2013, soil samples were collected to investigate the ROW adjacent to these properties. Analytical results indicated that one location in the ROW had results that exceeded NC ROD RGs. The location exceeding the NC ROD RGs in the Pershall Road ROW adjacent to these properties is being investigated separately. Further sampling was conducted to ensure that no contamination had migrated onto VPs 60, 61, or 62 or Parcels 09K120104A and 09K120104B.

The results of the PDI and FSS are documented in the *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 60, 61, and 62 and Parcels 09K130104A and 09K130104B* (USACE 2013g). Based on the results, these properties meet the criteria for UUUE in accordance with the NC ROD.

IA-09 Ballfields (Phases 1, 2, and 2B Partial)

The IA-09 Ballfields area consists of approximately 242,811 m^2 (60 acres) of land located north of Lambert – St. Louis International Airport and adjacent to the SLAPS. The area is bordered to the south by McDonnell Boulevard, to the north by CWC and Frost Avenue, and to the east by Eva Avenue. The property is currently unused. Previous uses included agricultural land use followed by the construction of a baseball field complex. No traces of the former baseball fields remain with the exception of a small building and pad formerly in the center of the four fields on the eastern half of the property.

Remediation of the Ballfields is being completed in three phases, moving from east (upgradient) to west (downgradient). Phase 1 consists of 101,171 m^2 (25 acres) at the eastern end of the Ballfields. The Ballfields Phase 2 area is generally situated on the central drainage area of the IA-09 Ballfields, IA-08 North Ditch, and IA-09 North Ditch Properties. Phase 2B encompasses 44,515 m^2 (11 acres) located directly adjacent to the west side of the initial Phase 2 area. The Ballfields Phase 2B area includes the IA-09 Ballfields (western portion), IA-08 North Ditch (western portion), and IA-09 North Ditch (western portion).

A PDI soil boring and sampling program was performed periodically between 2005 and 2008 over the Ballfields area and adjoining properties. Results are documented in the *Pre-Design Investigation Summary Report, Investigation Area (IA)-09: Ballfields, IA-08: North Ditch, IA-09: North Ditch, and Ballfields: North of IA-09, North St. Louis County Sites* (USACE 2008c). The results confirmed that areas remained that exceeded the NC ROD RGs. An additional PDI that focused on the Ballfields Phase 2 area was conducted in 2011 and 2012.

Phase 1 was remediated between November 10, 2011, and July 25, 2012. Approximately 8,260 in situ yd^3 (6,315 m^3) of radiologically contaminated soils were removed from the Ballfields Phase 1 area. Remediation of Phase 2, encompassing 17 acres (68,796 m^2), was initiated in early July 2012 and was completed in the fourth quarter of CY 2013. Evaluation of the PDI data indicated the presence of three discrete areas within the Ballfields Phase 2B area that contained concentrations of radiological COCs exceeding the NC ROD RGs. There were no exceedances of the NC ROD RGs for the non-radiological COCs in the Ballfields Phase 2B area. Remediation of the Phase 2B area was initiated in July 2012 and is ongoing.

Frost Avenue Right-of-Way Adjacent to VP-21

The Frost Avenue ROW refers to an 800-ft (243.8-m) long portion of the Frost Avenue ROW located northeast of the SLAPS between Eva Avenue and Frost Industrial Lane. It includes the portion of the ROW located north of the pavement and fronting VP-21. A PDI was conducted in the Frost Avenue ROW in 2003 and 2005. The results of the PDI are presented in the *North St. Louis County Frost Avenue Right-of-Way Remedial Design/Remedial Action Work Description* (USACE 2011h). Remediation was performed in January 2012. Approximately 26 in situ yd^3 (19.9 m^3) of radiologically contaminated soils and 33 loose yd^3 (25.2 m^3) of excavated waste materials and construction debris were removed from the Frost Avenue ROW property. The remedial action at the Frost Avenue ROW property is documented in the *Remedial Action Summary for the Frost Avenue Right-of-Way, FUSRAP North St. Louis County Sites* (USACE 2013j).

VP-16 and Norfolk Southern/Eva Loadout Facility

VP-16 is located at 6685 Frost Industrial Lane and is owned by the City of St. Louis. The Norfolk Southern Railroad/Eva Loadout Facility area is located south of VP-16 in the northwest corner of the intersection of Eva Road and McDonnell Boulevard. The Eva Loadout Facility was used by the DOE and the USACE to stockpile and ship contaminated soil, but has not been used for that purpose since 1999.

PDI samples were collected between October 2003 and December 2004 and between June 2011 and January 2012 to define the extent of contamination on these properties. The results of the investigation are documented in the *Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Property 16 and the Eva Loadout Facility* (USACE 2012k). A remedial action was conducted from May 20 to June 3, 2013. Approximately 68 in situ yd^3 (52 m^3) of soils were excavated from VP-16 and shipped via rail to a properly licensed, out-of-state disposal facility in 2013. Implementation of the remedial action required coordination with the Norfolk Southern Railroad to remove nearby railroad tracks from service to ensure safe operation of remedial activities.

The remedial actions at VP-16 and at the Eva Loadout Facility are being documented separately. The remedial action at VP-16 is documented in the *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Vicinity Property 16* (USACE 2014e). The Eva Loadout Facility will be addressed at a later date.

Banshee Road

An abandoned culvert pipe was encountered in the ROW of Banshee Road in August 2008 during the remediation of IA-13. The abandoned culvert pipe was located south of Banshee Road, approximately 150 ft (46 m) west of the intersection of Banshee Road and McDonnell Boulevard. Analytical results of soil and sediment samples collected at that time from the interior of the culvert pipe indicated that radiological contamination was present above ROD RGs (USACE 2013k). No further removal of the culvert pipe was attempted at that time because of the proximity to the roadway and the need to expeditiously complete the remedial action and release the site to the property owner. Excavation and removal of sections of the pipe were conducted between September 9 and September 26, 2013, with surface restoration completed on October 14, 2013 (USACE 2013k).

General Remediation Matters

FSSs compatible with the MARSSIM are performed after response actions at the North St. Louis County Sites. These FSSs document achievement of the removal action criteria identified in applicable EE/CAs and RGs identified in the NC ROD (USACE 2005a). Results of FSSs are documented in PRAR-FSSE reports for properties requiring a response action or in PDI-FSSE reports for those properties not requiring a response action. Each of these reports will include a summary of the detailed documentation that confirms that the areas involved achieve NC ROD RGs. This documentation will specifically include residual concentrations of COCs (e.g., EPCs) and assessment of residual site risks and doses to confirm protectiveness.

System Operation/Operations and Maintenance

The O&M activities currently conducted at the North St. Louis County Sites include annual well inspections and maintenance of access controls, as necessary. The access controls currently maintained at the North St. Louis County Sites include the fences and signs at the HISS and Futura.

O&M documents describe the ongoing measures taken to ensure the remedy remains protective. No O&M documents have been required for the North St. Louis County Sites.

V. PROGRESS SINCE THE LAST REVIEW

This is the third five-year review for the SLDS and the North St. Louis County Sites. The last five-year review (the Second Five-Year Review Report) was completed and signed in September 2010. The protectiveness statements and the status of the recommendations and follow-up actions from the Second Five-Year Review Report (USACE 2010a) are presented by site in the following sections.

ST. LOUIS DOWNTOWN SITE

Protectiveness Statements from the Last Five-Year Review

> Since the remedial action of the SLDS OU is under construction and is not yet completed, the remedy at the SLDS OU is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.
>
> The review indicates that while conditions at the SLDS may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of SLDS workers and other potential exposure groups (USACE 2010a).

Status of Recommendations and Follow-up Actions from the Last Five-Year Review

Two issues were identified for the SLDS in Section IX of the Second Five-Year Review Report:

- Exceedance of the ILs in HU-B ground water at the SLDS and
- Radon monitoring at Buildings 101 and 25 at the SLDS.

The recommendations and follow-up actions to address the exceedance of the ILs in HU-B ground water include continued monitoring of the Mississippi Alluvial Aquifer (HU-B) to monitor the effectiveness of the source removal action. Progress has been made since the last review in remediating potential source areas beneath Building 101 in Plant 6WH. The total U concentrations at DW-19 are lower during this five-year review period than they were during the previous five-year review period. During the previous review period (September 2003 through December 2008), concentrations of total U ranged from 73 to 200 µg/L, with an average concentration of 128 µg/L. During this review period (January 2009 through December 2013), concentrations ranged from 37 to 118 µg/L, with an average concentration of 67 µg/L. This decrease is likely due to the ongoing excavation of potential contaminant sources beneath the Building 101 area. However, total U and arsenic concentrations in HU-B ground water continue to exceed the ILs. Monitoring of the Mississippi Alluvial Aquifer (HU-B) will continue. When remediation of Plant 6 is completed, Phase 2 of the GRAAA will be initiated to evaluate the fate and transport of the COCs in HU-B ground water.

A recommendation to conduct radon monitoring at Buildings 101 and 25 was identified in Section IX of the Second Five-Year Review Report based on concerns about potential radon (Rn)-222 emissions from inaccessible soil contamination remaining beneath the structures. As part of the RI for the ISOU at the SLDS conducted between May 2009 and August 2010, soil samples were collected beneath Building 25 and in areas immediately adjacent to the structure (USACE 2012a). Based on these sampling results, the low concentrations of Ra-226 and Th-230 detected in inaccessible soil beneath Building 25 would not result in unacceptable radon concentrations reaching potential receptors. Therefore, radon monitoring was not required at

Building 25. In addition, the recommended radon monitoring at Building 101, which was the responsibility of Mallinckrodt, is no longer required due to the demolition of Building 101 in CY 2012. However, based on the ISOU RI data, indoor air monitoring for Rn-222 is currently being conducted at two buildings at the SLDS (Plant 1 Building 26 and the DT-4 North - South Storage Building), where average inaccessible soil concentrations of Ra-226 exceed 40 *CFR* 192.12(a) levels (i.e., 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil). The monitoring helps to ensure that the industrial worker is fully protected. Monitoring results verify that the average annual radon concentration is less than the 40 *CFR* 192.12(b) criterion of 0.02 working level (WL) in each building. The results of the air monitoring are reported in the annual Environmental Monitoring Data and Analysis Reports (EMDARs) and are summarized in Section VI of this document.

NORTH ST. LOUIS COUNTY SITES

Protectiveness Statements from the Last Five-Year Review

> Since the remedial action of the North St. Louis County Sites OU is under construction and is not yet completed, the remedy at the North St. Louis County Sites OU is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.
>
> The review indicates that while conditions at the North St. Louis County Sites may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of North St. Louis County Sites workers and other potential exposure groups (USACE 2010a).

Status of Recommendations and Follow-up Actions from the Last Five-Year Review

Two issues were identified for the North St. Louis County Sites in the Second Five-Year Review Report: the elevated total U concentrations in shallow ground water at the SLAPS and the completion of the PDI report for CWC Reach A.

The recommendations and follow-up actions for the ground-water issue from the last review included continuation of monitoring of the ground water, surface water, and sediment to ensure that the elevated total U concentrations in shallow ground water do not impact CWC. The CWC surface-water sampling results indicate there have been no increases in total U concentrations. An evaluation of concentration trends for this review period for surface water, sediment, and ground water is presented in Section VI of this five-year review report.

The recommendation for the PDI report for CWC Reach A included completion of a regulatory review copy of the report by August 2011. The completion of the PDI report for CWC Reach A was delayed to conduct additional sampling needed to resolve regulator concerns regarding sampling depths and to provide an adequate statistical coverage for defining the extent of contamination. The PDI Work Plan for the portion of Reach A extending from McDonnell Boulevard to Frost Avenue, titled *Pre-Design Investigation Work Plan Coldwater Creek: Northwest of Investigation Area-09 and Investigation Area-10, St. Louis Airport Site Vicinity Properties, FUSRAP North St. Louis County Sites,* was issued in November 2012 (USACE 2012j). PDI sampling was conducted within CWC from McDonnell Boulevard to Frost Avenue in CY 2012 and CY 2013. The *Pre-Design Investigation Summary Report for Coldwater Creek from McDonnell Boulevard to Frost Avenue* was issued in March 2014

(USACE 2014f). In February 2014, the *Pre-Design Investigation Work Plan for Coldwater Creek from Frost Avenue to St. Denis Bridge*, which covers the remainder of CWC Reach A, as well as Reach B and a portion of Reach C, was issued (USACE 2014g). PDI sampling in this portion of CWC is ongoing.

ST. LOUIS SITES

Status of Recommendations and Follow-up Actions from the Last Five-Year Review

Two additional issues were identified in the Second Five-Year Review Report that involve both the SLDS and the North St. Louis County Sites: the *Community Involvement Plan for the St. Louis FUSRAP Sites, Revision 0, for St. Louis, Missouri* (CIP) (USACE 2015), and notifications to landowners/tenants regarding the excavation of soils on unremediated properties. To address the first issue, extensive revisions have been made to the CIP in response to the progress of the remediation and the changing concerns of the community. These revisions include updated information regarding the status of the remediation at each site and a summary of the public involvement activities conducted since issuance of the previous *Community Relations Plan for the St. Louis FUSRAP Sites, Revision 4, for St. Louis, Missouri* (community relations plan) (USACE 2003d). The final CIP (Revision 0) (USACE 2015) was issued in May 2015.

The USACE has taken follow-up action with regard to the issue concerning the notification of landowners and tenants. The USACE meets with business/property owners to obtain the rights of entry (ROEs) for their properties. The USACE is in contact with the business/property owners adjacent to CWC to obtain ROEs and to explain the sampling process on their properties. After obtaining an ROE, the USACE sends postcards to the business/property owners to inform them that sampling will begin on their property soon and to provide contact information in case the business/property owners have any questions or concerns. After sampling is completed, the USACE leaves a door-hanger notice informing the business/property owners that sampling was completed on their property. The notice also contains contact information if the business/property owners have any questions or concerns. In February 2011, the USACE issued notification letters to property owners, tenants, and utility companies to keep them informed/aware of possible contamination on their properties. The letters also provided guidance on how to request assistance from the USACE before making property improvements in order to minimize the potential adverse effects of contamination on their properties. In order to minimize the problems with road closures associated with cleanup activities along Hazelwood Avenue and Eva Road, the USACE set up an email notification list for those business owners and employees that wanted to be updated on the road closures. In addition to the notifications, the USACE continues to distribute a newsletter twice a year to provide updates on the status of the cleanup.

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VI. FIVE-YEAR REVIEW PROCESS

ADMINISTRATIVE COMPONENTS

The five-year review process for the third five-year review of the St. Louis FUSRAP Sites included notifying regulatory agencies, the community, and other interested parties of the start of the third five-year review; establishing the five-year review team in consultation with the USEPA and MDNR; reviewing relevant documents and data pertaining to the remedial actions conducted at the SLS over the past 5 years; conducting site inspections; conducting site interviews; and developing/reviewing this five-year review report. Each of these elements is discussed in the following sections.

Specific individuals forming the five-year review team included: Susan Adams (Project Engineer, USACE); Brenton Barkley (Project Manager for the SLDS, USACE); Tiffany Burgess (Environmental Specialist, MDNR); Daniel Carey (Environmental Engineer, MDNR); Matthew Jefferson (Superfund Remedial Project Manager, USEPA Region 7); and Jo Anne Wade (Project Manager for the North St. Louis County Sites, USACE).

Community Involvement

Activities to involve the community in the five-year review were initiated in CY 2014. Information about the third five-year review was presented in the Winter 2014 *FUSRAP Update: The St. Louis Sites* newsletter issued to the site mailing list. A public notice will be published announcing that this five-year review report for St. Louis FUSRAP Sites is complete and available at the St. Louis FUSRAP Project Office and at the St. Louis Public Library, Government Information Room, 1301 Olive Street, St. Louis, Missouri.

Document Review

The following sections list the documents assessed as part of this five-year review. Additional information concerning these documents can be found in Appendix A. The documents are categorized as follows.

Basis for Response Actions

The documents listed in Table VI-1 identify the background and goals of the remedies and any changes in laws and regulations that may affect the response action. These documents also provide background information on the sites, basis for action, and clean-up levels, and address community concerns and preferences.

Table VI-1. List of Response Action Documents

Document	Property	Purpose	Use for Review
Engineering Evaluation/Cost Analysis for Decontamination at the St. Louis Downtown Site, May 1991 (DOE 1991)	SLDS	Propose removal action alternatives	Goal of Removal Background Basis for Action Clean-up Levels Community Concerns
Engineering Evaluation/Cost Analysis-Environmental Assessment for the Proposed Decontamination of the Vicinity Properties in the Vicinity of the Hazelwood Storage Site, March 1992 (DOE 1992)	Latty Avenue Properties	Propose removal action alternatives	Goal of Removal Background Basis for Action Clean-up Levels Community Concerns

Table VI-1. List of Response Action Documents (Continued)

Document	Property	Purpose	Use for Review
St. Louis Site Action Memorandum for Vicinity Property Cleanups, June 2, 1995 (DOE 1995a)	North St. Louis County Sites VPs	Record selected response action	Goal of Remedy Basis for Action
St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA), September 1997 (DOE 1997a)	SLAPS	Propose removal action alternatives	Goal of Removal Background Basis for Action Clean-up Levels Community Concerns
SLAPS Action Memorandum for the Removal of Radioactively Contaminated Material, September 1997 (DOE 1997b)	SLAPS	Record selected removal action	Goal of Removal Basis for Action
Record of Decision for the St. Louis Downtown Site, October 1998 (USACE 1998a)	SLDS	Record selected remedial decision	RGs Background Basis for Action Community Concerns
Engineering Evaluation/Cost Analysis-Environmental Assessment for the Hazelwood Interim Storage Site (HISS), October 1998 (USACE 1998b)	HISS	Propose removal action alternatives	Goal of Removal Background Basis for Action Clean-up Levels Community Concerns
Action Memorandum for the Removal of Radioactively Contaminated Material at the Hazelwood Interim Storage Site and Latty Avenue Vicinity Properties, June 1998 (USACE 1998c)	HISS	Record selected removal action	Goal of Removal Basis for Action
Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum, March 1999 (USACE 1999a)	SLAPS	Record removal decision	Goal of Removal Background Basis for Action Clean-up Levels Community Concerns
Five-Year Review Report: Initial Five-Year Review Report for the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites, August 23, 2004 (USACE 2004a)	ALL	Determine whether remedy is protective of human health and the environment	Background Basis for Action Community Concerns Progress during review period Determine if follow-up actions need to be implemented
Memorandum for Record: Non-Significant Changes to the Record of Decision for the St. Louis Downtown Site, March 31, 2005 (USACE 2005b)	SLDS	Document non-significant changes to final remedy	Goal of Remedy Background Basis for Action
Record of Decision for the North St. Louis County Sites, September 2, 2005 (USACE 2005a)	SLAPS, SLAPS VPs, Latty Avenue Properties	Record selected remedial decision	RGs Background Basis for Action Community Concerns
Five-Year Review Report: Second Five-Year Review Report for the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites, September 22, 2010 (USACE 2010a)	ALL	Determine whether remedy is protective of human health and the environment	Background Basis for Action Community Concerns Progress since last review Determine if follow-up actions from previous review were implemented Determine if additional follow-up actions need to be implemented

Implementation of the Response

The documents listed in Table VI-2 furnish information about design assumptions and documentation of the response actions at the sites.

Table VI-2. List of Implementation Documents

Document	Property	Purpose	Use for Review
Pre-Design Investigation Data Summary Report, Plants 6 East Half and 6E, FUSRAP St. Louis Downtown Site, August 18, 2000 (IT 2000)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report: Hazelwood Interim Storage Site (HISS)-Main Pile Removal Action, December 2000 (USACE 2000)	HISS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Data Summary Report: Heintz Steel and Manufacturing Vicinity Property (DT-6), FUSRAP St. Louis Downtown Site, July 28, 2000 (IT 2001a)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report, Plants 6 West Half and 7W, FUSRAP St. Louis Downtown Site, January 26, 2001 (IT 2001b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Data Summary Report, Plants 7 North and 7 South, September 23, 2004 (USACE 2004b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Data Summary Report, Gunther Salt South Vicinity Property (DT-4 South), May 24, 2005 (USACE 2005f)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for Gunther Salt North, June 9, 2005 (USACE 2005e)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura, December 6, 2006 (USACE 2006d)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for FUSRAP Coldwater Creek Vicinity Property 08(C) & Latty Avenue Vicinity Properties 01(L), & 40A East, & Parcel 10K530087, January 12, 2007 (USACE 2007b)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation and Final Status Survey Evaluation for the SLAPS Vicinity Properties 21, 22, 23, 24, 26, 28, 29, 30 and 31, North St. Louis County Sites, May 7, 2008 (USACE 2008b)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria

Table VI-2. List of Implementation Documents (Continued)

Document	Property	Purpose	Use for Review
Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L), May 7, 2008 (USACE 2008a)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report, Investigation Area (IA)-09: Ballfields, IA-08: North Ditch, IA-09: North Ditch, and Ballfields: North of IA-09, North St. Louis County Sites, October 23, 2008 (USACE 2008c)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Data Summary Report, City Property Vicinity Property (DT-2), FUSRAP St. Louis Downtown Site, May 6, 2009 (USACE 2009b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-35 and DT-36, May 7, 2009 (USACE 2009a)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 17, 18, 19, 20, 20A, and 25, August 12, 2009 (USACE 2009d)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Property 63, August 13, 2009 (USACE 2009g)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 53, 54, and 55, August 14, 2009 (USACE 2009h)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51 and 52, September 18, 2009 (USACE 2009e)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Properties 03, 04, 05, and 06, October 23, 2009 (USACE 2009i)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report–FUSRAP St. Louis Airport Vicinity Properties 9, 10, 11, and 12, Investigation Area 9 Ballfield Hotspot, and the Investigation Area 10 Hotspot, November 3, 2009 (USACE 2009j)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria

Table VI-2. List of Implementation Documents (Continued)

Document	Property	Purpose	Use for Review
Pre-Design Investigation Data Summary Report, Terminal Railroad Association Vicinity Property (DT-9), FUSRAP St. Louis Downtown Site, April 7, 2010 (USACE 2010c)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Data Summary Report, Burlington Northern Santa Fe Railroad Vicinity Property (DT-12), FUSRAP St. Louis Downtown Site, April 21, 2010 (USACE 2010d)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 33, 34, and 37, September 23, 2010 (USACE 2010f)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor, October 25, 2010 (USACE 2010b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for the Latty Avenue Vicinity Property 06(L), April 5, 2011 (USACE 2011i)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Properties 03 and 04, June 24, 2011 (USACE 2011b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Addendum to the Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L) – Building Interior and Exterior Data, April 4, 2012 (USACE 2012g)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Property 16 and the Eva Loadout Facility, April 19, 2012 (USACE 2012k)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Addendum to the Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura – Building Interior and Exterior Data, May 2, 2012 (USACE 2012f)	Latty Avenue Properties	Record investigation data	Check whether contaminant levels meet criteria

Table VI-2. List of Implementation Documents (Continued)

Document	Property	Purpose	Use for Review
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Metropolitan St. Louis Sewer District Lift Station (DT-15), August 27, 2012 (USACE 2012b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property DT-34, September 21, 2012 (USACE 2012e)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report, Kiesel Hall Street Property, FUSRAP St. Louis Downtown Site, March 14, 2013 (USACE 2013b)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 60, 61, and 62 and Parcels 09K130104A and 09K130104B, , July 30, 2013 (USACE 2013g)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation and Final Status Survey Evaluation for Vicinity Property 40A (Partial), August 13, 2013 (USACE 2013e)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 09(C), 10(C), and the Road Right-of-Way (Partial), September 18, 2013 (USACE 2013i)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Lange-Stegmann (DT-37), September 23, 2013 (USACE 2013a)	SLDS	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report for Coldwater Creek from McDonnell Boulevard to Frost Avenue, March 31, 2014 (USACE 2014f)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 01, 02, 07, 13, 14, 15, and Investigation Area 11 (Partial), September 3, 2014 (USACE 2014d)	SLAPS VPs	Record investigation data	Check whether contaminant levels meet criteria

Operations and Maintenance

O&M documents describe the ongoing measures at the site to ensure the remedy remains protective. The removal actions or remedial actions completed to date have allowed for UUUE at the property. Therefore, no O&M documents have been required. If institutional controls are necessary for the property to meet the criteria for unrestricted use, O&M documents will be completed and discussed in subsequent five-year review reports.

Response Action Performance

Monitoring data, progress reports, and performance evaluation reports listed in Table VI-3 provide information that can be used to determine whether the response action continues to operate and function as designed.

Table VI-3. List of Response Action Evaluation Documents

Document	Property	Purpose	Use for Review
Post-Remedial Action Report for the St. Louis Downtown Site City-Owned Vicinity Property, September 1999 (USACE 1999b)	SLDS VP	Document that construction activities are complete	History of City-Owned VP Status of City-Owned VP Chronology of activities Lessons learned
Post-Remedial Action Report for the St. Denis Bridge Area, July 1999 (USACE 1999c)	SLAPS VPs	Document that construction activities are complete	History of St. Denis Bridge Area Status of St. Denis Bridge Area Chronology of activities Lessons learned
Vicinity Property 38 Removal Action Summary, Berkeley, Missouri, April 9, 2001 (USACE 2001)	SLAPS VPs	Document that response actions are complete	History of SLAPS VP-38 Status of SLAPS VP-38 Chronology of activities
Post-Remedial Action Report for the Accessible Soils within the Downtown Site Plant 2 Property, January 2002 (USACE 2002b)	SLDS	Document that construction activities are complete	Effectiveness of the remedial action at Plant 2
Final Status Survey Evaluation Report for the St. Louis Downtown Site Archer Daniels Midland Vicinity Property (DT-1), June 2002 (USACE 2002a)	SLDS	Document that RGs were met	Effectiveness of the remedial action at St. Louis Downtown Site Kiesel (formerly ADM) VP (DT-1)
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Plant 1 Property September 10, 2004 (USACE 2004c)	SLDS	Document that construction activities are complete	Status of Plant 1 Chronology of activities Effectiveness of the remedial action at Plant 1
VP-2(L) Building Roof Remediation Final Status Survey Evaluation Report, August 31, 2005 (USACE 2005g)	Latty Avenue Properties	Present FSS data	Check whether contaminant levels meet criteria
Post-Remedial Action Report for the Soils Within the St. Louis Downtown Site City of Venice, Illinois Property (DT-11), September 2005 (USACE 2005h)	SLDS	Document that construction activities are complete	Status of City of Venice, Illinois, VP (DT-11) Chronology of activities Effectiveness of the remedial action at DT-11

Table VI-3. List of Response Action Evaluation Documents (Continued)

Document	Property	Purpose	Use for Review
Post-Remedial Action Report for the Accessible Soils Within the St. Louis Downtown Site, Heintz Steel and Manufacturing Vicinity Property (DT-6) and Midwest Waste Vicinity Property (DT-7), September 22, 2005 (USACE 2005d)	SLDS	Document that construction activities are complete	Status of Heintz Steel and Manufacturing and Midwest Waste VPs (DT-6 and DT-7) Chronology of activities Effectiveness of the remedial action at DT-6 and DT-7
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Midtown Garage Vicinity Property (DT-29), October 18, 2005 (USACE 2005i)	SLDS	Document that construction activities are complete	Status of Midtown Garage VP (DT-29) Chronology of activities Effectiveness of the remedial action at DT-29
Final Status Survey Evaluation for the SLAPS Vicinity Property 27, March 30, 2006 (USACE 2006e)	SLAPS VPs	Present FSS data	Check whether contaminant levels meet criteria
Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties West of Broadway, Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots, May 25, 2006 (USACE 2006c)	SLDS	Present FSS data	Check whether contaminant levels meet criteria
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site, Includes Investigation Areas 01 through 07, Investigation Area 08: South Ditch, Parts of Investigation Areas 11 and 12, and Coldwater Creek: West of IA-01, May 14, 2009 (USACE 2009c)	SLAPS	Document that construction activities are complete	Status of the SLAPS Chronology of activities Effectiveness of the remedial action at the SLAPS
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087, May 28, 2010 (USACE 2010e)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-01(L) and Parcel 10K530087
Post-Remedial Action Report and Final Status Survey Evaluation for Hazelwood Avenue, the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 32, 35, 35A, 36, 39, 40, 42 and 47, September 28, 2010 (USACE 2010g)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of Activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at the Hazelwood Avenue VPs
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Thomas and Proetz Lumber Company (DT-10), July 12, 2010 (USACE 2010h)	SLDS	Document that construction activities are complete	Status of Thomas and Proetz Lumber Company VP (DT-10) Chronology of activities Effectiveness of the remedial action at DT-10

Table VI-3. List of Response Action Evaluation Documents (Continued)

Document	Property	Purpose	Use for Review
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Northeast Corner of Plant 9 and Security Gate Number 49 Area, November 2, 2010 (USACE 2010i)	SLDS	Document that construction activities are complete	Status of Plant 9 and Security Gate Number 49 Area Chronology of activities Effectiveness of the remedial action at Plant 9 and Security Gate Number 49 Area
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 05 and 06, August 3, 2011 (USACE 2011g)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-05 and VP-06
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 08 and 09, August 3, 2011 (USACE 2011j)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-08 and VP-09
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 53, August 15, 2011 (USACE 2011f)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-53
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 63, September 8, 2011 (USACE 2011c)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-63
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 54, December 12, 2011 (USACE 2011d)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-54
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 55, December 12, 2011 (USACE 2011e)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-55
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Christiana Court, LLC (DT-17), May 18, 2012 (USACE 2012l)	SLDS	Document that construction activities are complete	Status of Christiana Court VP (DT-17) Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at DT-17

Table VI-3. List of Response Action Evaluation Documents (Continued)

Document	Property	Purpose	Use for Review
Updated Remedial Action Summary for Phase 1 Portion of City Property (DT-2) West of Mississippi River Flood Protection Levee, FUSRAP St. Louis Downtown Site, June 19, 2012 (USACE 2012c)	SLDS	Document that construction activities are complete	Status of the City Property VP (DT-2) Chronology of activities Effectiveness of the remedial action at DT-2
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 03(L), 04(L), 05(L), and 06(L), September 27, 2012 (USACE 2012i)	Latty Avenue Properties	Document that construction activities are complete	Status of Latty Avenue Properties Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VPs 03(L) through 06(L)
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Gunther Salt (DT-4), September 14, 2012 (USACE 2012d)	SLDS	Document that construction activities are complete	Status of Gunther Salt VP (DT-4) Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at DT-4
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L), December 21, 2012 (USACE 2012h)	Latty Avenue Properties	Document that construction activities are complete	Status of Latty Avenue Properties Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-02(L)
Remedial Action Summary for the Frost Avenue Right-of-Way, FUSRAP North St. Louis County Sites, January 30, 2013 (USACE 2013j)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Effectiveness of the remedial action at the Frost Avenue ROW
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property PSC Metals, Inc. (DT-8), July 15, 2013 (USACE 2013l)	SLDS	Document that construction activities are complete	Status of the PSC Metals VP (DT-8) Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at DT-8
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 10, 11, and 12, September 5, 2013 (USACE 2013h)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VPs 10, 11 and 12
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Terminal Railroad Association Soil Spoils Area, Rev. 0, September 10, 2013 (USACE 2013m)	SLDS	Document that construction activities are complete	Status of the TRRA Soil Spoils Area Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at the TRRA Soil Spoils Area

Table VI-3. List of Response Action Evaluation Documents (Continued)

Document	Property	Purpose	Use for Review
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 31A, September 18, 2013 (USACE 2013i)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at VP-31A
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Norfolk Southern Railroad (DT-3), September 23, 2013 (USACE 2013n)	SLDS	Document that construction activities are complete	Status of the Norfolk Southern Railroad VP (DT-3) Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at DT-3
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site, September 25, 2013 (USACE 2013c)	Latty Avenue Properties	Document that construction activities are complete	Status of the Latty Avenue Properties Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at the HISS
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority, September 27, 2013 (USACE 2013o)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at IA -13
Remedial Action Summary for the Abandoned Culvert Pipe at the St. Louis Airport Site Vicinity Property Investigation Area-13: Airport Authority and Banshee Road, December 19, 2013 (USACE 2013k)	SLAPS VPs	Document that construction activities are complete	Status of the SLAPS VPs Chronology of activities Effectiveness of the remedial action at Banshee Road
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Burlington Northern Santa Fe Railroad (DT-12), August 19. 2014 (USACE 2014b)	SLDS	Document that construction activities are complete	Status of the BNSF Railroad VP (DT-12) Chronology of activities Check whether contaminant levels meet criteria Effectiveness of the remedial action at DT-12
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009, August 5, 2010 (USACE 2010j)	SLDS	Record and evaluates monitoring data	Check whether contaminant levels meet comparison values
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009, August 5, 2010 (USACE 2010k)	SLAPS, SLAPS VPs, Latty Avenue Properties	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2010, July 8, 2011 (USACE 2011k)	SLDS	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values

Table VI-3. List of Response Action Evaluation Documents (Continued)

Document	Property	Purpose	Use for Review
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2010, July 8, 2011 (USACE 2011l)	SLAPS, SLAPS VPs, Latty Avenue Properties	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2011, July 13, 2012 (USACE 2012m)	SLDS	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2011, July 13, 2012 (USACE 2012n)	SLAPS, SLAPS VPs, Latty Avenue Properties	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2012, July 19, 2013 (USACE 2013p)	SLDS	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2012, July 19, 2013 (USACE 2013q)	SLAPS, SLAPS VPs, Latty Avenue Properties	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013, July 23, 2014 (USACE 2014h)	SLDS	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013, July 23, 2014 (USACE 2014i)	SLAPS, SLAPS VPs, Latty Avenue Properties	Records and evaluates monitoring data	Check whether contaminant levels meet comparison values

Legal Documentation

In October 1998, Congress transferred responsibility for the administration and execution of the FUSRAP from the DOE to the USACE in the Energy and Water Development Appropriations Act, Public Law 105-62. Provisions of the appropriations acts for fiscal years (FYs) 1999 and 2000 clarified Congressional intent that the USACE should conduct FUSRAP activities subject to the CERCLA and the NCP. In March 1999, the USACE and the DOE executed an MOU, which identifies program administrative and execution responsibilities for the two agencies. The USACE is currently conducting FUSRAP response actions at the SLS under the legislative authority in the appropriations acts; subject to the CERCLA, the NCP, and Executive Order 12580 implementing the CERCLA; and in accordance with the MOU. The MOU designated the DOE as responsible for long-term stewardship.

Community Involvement

The CIP (USACE 2015) helps give an understanding of the history of the community involvement and other activities at the SLS. Current community involvement actions are being carried out under the existing community relations plan (USACE 2003d). The final CIP (Revision 0) was issued in May 2015.

The USACE uses several methods to involve the community in the cleanup process. The USACE participates in the St. Louis Oversight Committee's meetings and issues newsletters to keep the public informed about the progress of the remediation activities.

Data Review

The data review component of this five-year review consisted of examining environmental monitoring data collected as part of response actions conducted at the SLDS and the North St. Louis County Sites. An environmental monitoring program was implemented at the SLS beginning in CY 1998. This program is an integrated monitoring program with sampling locations and frequencies defined on the basis of site-specific permits/permit equivalents, decision documents, and a commitment to be protective of human health and the environment and demonstrate short-term effectiveness pursuant to CERCLA.

Ground water, air, surface water and sediment are sampled and analyzed as part of the environmental monitoring program. A discussion of the review of these data by site is presented in the following paragraphs.

Environmental monitoring data are collected quarterly; however, these data are not evaluated as part of the quarterly reporting. Therefore, the environmental monitoring program includes the preparation of an annual EMDAR that consolidates and evaluates the environmental monitoring data. The annual reports are prepared by CY and summarize the data obtained during the CY and provide trend analyses of the data.

The environmental monitoring program is evaluated at the end of each CY. The result of this evaluation is the development of an annual environmental monitoring implementation program for the following CY. The sampling locations and activities of the program are not static because of the evolving nature of the response actions being conducted at the SLS. Accordingly, sampling activities may be eliminated in subsequent years because the monitoring is no longer pertinent (e.g., perimeter airborne particulate monitoring would not be pertinent once a property had been remediated and the site restored). Conversely, an increased sampling frequency may be incorporated into the program to address an elevated intensity of response actions at a site. Sampling frequencies are driven by the sampling data collected. For example, if data trends indicate short-term increasing concentrations, the sampling frequency may be increased.

The data reviewed included those data presented in the PRAR-FSSE reports prepared at the completion of response actions. Data generated by response actions that are not complete were not reviewed. These data will be reviewed for the next five-year review report. Only the conclusions presented in the PRAR-FSSE reports regarding compliance with response action goals and future use of the property evaluated are presented in this report. For the complete analysis of the data, please refer to the individual PRAR-FSSE reports.

The data presented in the annual EMDARs from CY 2009 through CY 2013 were also reviewed (SLDS EMDARs for CY 2009 through CY 2013 [USACE 2010j, 2011k, 2012o, 2013p, and 2014d] and North St. Louis County Sites EMDARs for CY 2009 through CY 2013 [USACE 2010k, 2011l, 2012p, 2013q, and 2014e]). Only a summary of the data evaluations is presented here. For a complete presentation and evaluation of the data reviewed, please refer to the annual EMDARs for each CY.

Ground-Water Monitoring

Ground-water monitoring is conducted at the SLS to meet several general objectives. These objectives are to:

- identify potential impacts to ground-water quality resulting from removal actions and remedial actions;
- obtain requisite data to evaluate response action performance; and

- ensure compliance with the SLDS ROD (USACE 1998a) and NC ROD (USACE 2005a) requirements.

Pursuant to these objectives, comparison values were established to evaluate ground-water data obtained under the ground-water monitoring program for the SLS. These comparison values are derived from the SLDS ROD (USACE 1998a), the NC ROD (USACE 2005a), and environmental regulatory programs.

The ground-water monitoring data at the North St. Louis County Sites are currently evaluated against the requirements for ground-water monitoring identified in the NC ROD (USACE 2005a). The NC ROD identifies two types of monitoring guidelines: (1) response-action monitoring guidelines and (2) a total U monitoring guide (which is used for both response-action and long-term monitoring). The NC ROD guideline for response-action monitoring is two times the UCL_{95}, based on historical concentrations of the analyte in a particular well before remedial actions were initiated under the NC ROD. The total U monitoring guide, used for both response-action and long-term monitoring, is defined in the NC ROD as 30 µg/L (USACE 2005a). The total U concentrations are calculated for each sample from the isotopic uranium results and specific activities. A full list of the well-specific monitoring guidelines for the North St. Louis County Sites is presented in Appendix F of the *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013* (USACE 2014i). The evaluation of the ground-water sampling results for CY 2009 through CY 2013 is based on comparisons to these NC ROD monitoring guidelines.

In addition, an evaluation of concentration trends is conducted for the COCs detected in ground water at concentrations above NC ROD ground-water monitoring guidelines or the SLDS ROD ILs to support assessment of the effectiveness of the remedial action. For those wells where the concentration of a site's COC exceeded its respective SLDS ROD IL or NC ROD monitoring guideline during the period of this review (CY 2009 through CY 2013), and sufficient detected results were available to evaluate a trend (i.e., a detection frequency greater than 50 percent), the unfiltered ground-water data were evaluated using the statistical Mann-Kendall Trend Test.

The Mann-Kendall Trend Test was selected because this test can be used with small sample sizes and irregular sampling frequencies. The Mann-Kendall Trend Test is a non-parametric test and, as such, is not dependent upon assumptions of distribution, missing data, or irregularly spaced monitoring periods. In addition, data reported as being less than the detection limit can be used. The results of the Mann-Kendall Trend Test are less reliable for datasets containing high numbers of non-detects, particularly if the detection limit changes over time. To address potential problems resulting from variable detection limits, non-detect values have been replaced with 0.5 of the lowest detection limit for the dataset. No general consensus has been established regarding the percentage of non-detects that can be handled by the Mann-Kendall Trend Test. However, because the Mann-Kendall Trend Test is a nonparametric test that uses relative magnitudes (not actual values), the test is generally valid even in instances with large numbers of non-detects.

One shortcoming of the Mann-Kendall Trend Test is that it assumes the data are not influenced by seasonal effects. In those instances in which the data is influenced seasonally, a seasonal Kendall Test can be performed to evaluate the seasonal variability. Alternatively, the Mann-Kendall Trend Test can be performed using only data collected from the particular season with the highest contaminant concentrations. However, these two options were not viable for the SLS due to the irregularly spaced monitoring periods. In addition, a consistent pattern of seasonal variation in concentrations was not indicated by the time-versus-concentration plots.

The use of data collected prior to the start of this review period (i.e., prior to January 2009) was necessary in order to have sufficient data to conduct statistical trend analysis for those wells that

are sampled less than annually. The test is used to assess whether a time-ordered dataset exhibits an increasing or decreasing trend within a predetermined level of significance. The Mann-Kendall Trend Test was performed at a 95 percent level of confidence (i.e., a significance level of 0.05). Statistically significant trends do not always reflect actual trends. The Mann-Kendall Trend Test does not consider the effects of measurement error and does not provide any information concerning the magnitude of the trends, so time-versus-concentration plots were used to evaluate these factors in those cases where the Mann-Kendall Trend Test results indicated the presence of a statistically significant trend.

ST. LOUIS DOWNTOWN SITE

Stratigraphy

Ground water at the SLDS is found within three HUs. These HUs are the upper HU-A unit, which consists of fill overlying clay and silt; the lower Mississippi Alluvial Aquifer, referred to as HU-B; and the limestone bedrock, referred to as HU-C.

Sampling Program

The SLDS ROD (USACE 1998a) requires the implementation of a long-term ground-water monitoring program at the site. The selected remedy includes the installation and monitoring of perimeter ground-water monitoring wells on a long-term basis. The goal of the ground-water monitoring program is to monitor the protection of the potentially usable HU-B ground water and establish the effectiveness of the source removal action. The HU-B ground-water results for the SLDS COCs are compared to the following SLDS ROD ground-water criteria (USACE 1998a):

1. The ILs: 50 µg/L arsenic, 5 µg/L cadmium, and 20 µg/L total U; and
2. The concentration limits from the Uranium Mill Tailings Radiation Control Act regulations listed in 40 *CFR* 192.02, Table 1 to Subpart A: 5 picocuries per liter (pCi/L) combined Ra-226 and Ra-228.

Because HU-A is not considered a potential source of drinking water, the SLDS ROD did not establish ground-water criteria for HU-A ground water.

The goal of the ground-water portion of the remedy is to monitor the usable aquifer (HU-B) to assure it is protected through the source removal. If monitoring of HU-B indicates that the concentrations of the SLDS COCs significantly exceed the SLDS ROD ground-water criteria, the SLDS ROD requires that a GRAAA be initiated to further assess the fate and transport of the COCs in HU-B and to determine if additional remedial actions are necessary. Total U concentrations were above the IL in HU-B well DW19 over an extended period, initiating Phase 1 of the GRAAA in CY 2001. The first phase of the GRAAA was completed in CY 2003 (USACE 2003c). Phase 1 summarized the sampling data available for the monitoring wells completed in HU-B and provided recommendations for further investigation of HU-B. Phase 2 of the GRAAA has not yet been initiated. Phase 2 will be conducted following completion of remedial activities at Plant 6WH in order to assess if remediation results in a decrease in the COC concentrations in HU-B ground water. The results of Phase 2 will be presented in a subsequent five-year review report.

As part of this five-year review, an evaluation of concentration trends has been conducted for the COCs detected above SLDS ROD ground-water criteria to support evaluation of the effectiveness of the remedial action. In addition, an evaluation of concentration trends is conducted for select COCs detected in HU-A ground water to assure protectiveness of the final remedy and to verify that ground-water conditions are not degrading.

A baseline-sampling event was conducted at the SLDS in December 1997 and January 1998. Regular monitoring of the SLDS HU-A and HU-B ground water was initiated in late CY 1998 pursuant to issuance of the SLDS ROD (USACE 1998a). A summary of the results of the ground-water sampling conducted at the SLDS during the period of this review (CY 2009 to CY 2013) follows. The locations of the ground-water monitoring wells at the SLDS are shown on Figure VI-1.

During CY 2009, 12 ground-water monitoring wells (three HU-A and nine HU-B) were sampled at the SLDS. Arsenic, cadmium, Th-228, Th-230, Th-232, U-234, U-238, and total U were detected in HU-A ground water. Three COCs (arsenic, cadmium, and total U) were detected at concentrations above the SLDS ROD ground-water criteria in HU-B ground water during CY 2009. Concentrations of arsenic exceeded the IL (50 µg/L) in DW14 (127 µg/L). Cadmium was detected in August 2009 at a concentration of 15 µg/L in DW17, which exceeded the IL of 5 µg/L. Concentrations of total U in the June 2009 sample from DW19 (81 µg/L) exceeded the IL (20 µg/L).

Ten (10) ground-water monitoring wells (two HU-A and eight HU-B) were sampled at the SLDS during CY 2010. Arsenic, cadmium, Th-228, U-234, U-238 and total U were detected in HU-A ground water. Three COCs (arsenic, cadmium, and total U) were detected at concentrations above the SLDS ROD ground-water criteria in HU-B ground water during CY 2010. Concentrations of arsenic exceeded the IL (50 µg/L) in B16W09D (185 µg/L) and DW18 (81.5 µg/L). Cadmium was detected in December 2010 at a concentration of 12.1 µg/L in DW17, which exceeded the SLDS ROD IL of 5 µg/L. Concentrations of total U exceeded the IL (20 µg/L) in the May 2010 sample from DW19 (61.8 µg/L).

In CY 2011, nine monitoring wells (two HU-A and seven HU-B) were sampled at the SLDS. Arsenic, cadmium, Th-230, and Th-238 were detected in HU-A ground water. Two SLDS COCs (total U and arsenic) were detected at concentrations above the SLDS ROD ground-water criteria in HU-B ground water during CY 2011. Concentrations of total U exceeded the IL (20 µg/L) in the November 2011 sample from DW19 (118.3 µg/L). Concentrations of arsenic exceeded the IL (50 µg/L) in DW14 (124 µg/L) and DW18 (74 µg/L).

Ten (10) ground-water monitoring wells (two HU-A and eight HU-B) were sampled at the SLDS during CY 2012. Arsenic, Th-230, U-234, U-238, and total U were detected in HU-A ground water. Three SLDS COCs (arsenic, cadmium, and total U) were detected at concentrations above the SLDS ROD ground-water criteria in HU-B ground water during CY 2012. The concentration of arsenic exceeded the IL (50 µg/L) in the December 2012 sample from DW18 (110 µg/L). The concentration of cadmium in the March 2012 sample from DW17 (5.7 µg/L) exceeded the IL (5 µg/L). However, when measurement error is taken into account, the cadmium result in DW17 was not above the IL. The concentration of total U exceeded the IL (20 µg/L) in the December 2012 sample from DW19 (38.4 µg/L).

Nine ground-water monitoring wells (three HU-A and six HU-B) were sampled at the SLDS during CY 2013. Arsenic, cadmium, U-234, U-238, and total U were detected in HU-A ground water. Two inorganic SLDS COCs (arsenic and cadmium) were detected at concentrations above the SLDS ROD ground-water criteria in HU-B ground water during CY 2013. The concentration of arsenic exceeded the IL (50 µg/L) in the December 2013 sample from DW18 (71 µg/L). The concentration of arsenic also exceeded the IL in the March and May 2013 samples from DW14 (1,100 µg/L and 100 µg/L, respectively) but fell below the IL in the December 2013 sample (16 µg/L). The concentration of cadmium in the March 2013 sample from DW14 (120 µg/L) exceeded the IL (5 µg/L), but decreased to levels below the IL in the subsequent May and December 2013 samples. A high turbidity value (401 nephelometric turbidity units) was reported for DW14 during the March 2013 sampling event, suggesting that the elevated arsenic and

cadmium results may have been due to particulates being inadvertently entrained in the March 2013 ground-water sample. The concentration of cadmium in the August 2013 sample from DW19 (6.5 µg/L) slightly exceeded the IL. However, when measurement error is taken into account, the result was not above the IL. One radiological COC, total U, was above the SLDS ROD ground-water criteria in HU-B ground water during CY 2013. The total U concentration exceeded the IL (20 µg/L) in the third quarter sample from DW19 (37.0 µg/L).

In summary, during the period of this review (January 2009 through December 2013), arsenic and total U continued to be detected in HU-B wells at levels exceeding the ILs established in the SLDS ROD. Phase 2 of the GRAAA will be conducted following completion of remedial activities at Plant 6WH in order to assess if remediation of that area results in a decrease in the COC concentrations in HU-B ground water. To support this assessment, concentration trends in HU-A and HU-B ground water are evaluated in the following section.

Trend Analysis

The Mann-Kendall Trend Test was conducted to evaluate possible trends for those COCs detected in HU-A and for those COCs that exceeded SLDS ROD ground-water criteria (ILs) in HU-B during one or more of the sampling events conducted during the review period (January 2009 and December 2013). Mann-Kendall Trend Tests were performed to evaluate concentration trends in unfiltered ground-water samples using the available ground-water sampling data for the period from January 2000 through December 2013. The use of data collected prior to the start of this review period (i.e., prior to January 2009) is necessary in order to have sufficient data to conduct statistical trend analysis for those wells that are sampled less than annually.

For the HU-A wells, the Mann-Kendall Trend Test was conducted for COCs for which these conditions were met: (1) the COC was detected at least once during the period of this review (January 2009 through December 2013); (2) sufficient sampling results were available (i.e., at least 6) for the period between January 2000 through December 2013; and (3) the detection frequency was greater than 50 percent. The following COCs were detected in HU-A wells at the SLDS during the period of this review and met the data requirements:

- Arsenic: B16W06S and DW21
- Th-230: B16W06S, B16W08S, B16W12S, and DW21
- Total U: B16W08S and B16W12S

For the HU-B wells, the Mann-Kendall Trend Test was conducted for COCs for which these conditions were met: (1) the COC was detected above the IL at least once during the period of this review; (2) sufficient sampling results were available (i.e., at least 6) for the period between January 2000 through December 2013; and (3) the detection frequency was greater than 50 percent. The following COCs exceeded their ILs in HU-B wells at the SLDS during the period of this review and met the data requirements:

- Arsenic: B16W09D, DW14, DW18, and DW22R
- Total U: DW19

In addition, the Mann-Kendall Trend Test was performed for one HU-B well (DW17) that exceeded the cadmium IL at the SLDS during the period of this review, but did not meet the data requirement of a detection frequency greater than 50 percent for the January 2000 through December 2013 period. In this case, the database was restricted to the January 2002 through December 2013 period in order to meet the detection frequency requirement while still retaining a sufficient number of samples to conduct the Mann-Kendall Trend Test.

Results of the Mann-Kendall Trend Tests are summarized in Table VI-4. Time-versus-concentration plots for those wells for which the Mann-Kendall Trend Test identified a significant trend are provided on Figure VI-2.

Table VI-4. Results of Mann-Kendall Trend Test for SLDS Ground Water

Analyte	Station	Hydrogeologic Unit	N[a]	DF[b]	S[c]	Trend[d]
Arsenic	B16W06S	HU-A	14	100	-32	Downward Trend
	B16W09D	HU-B	11	64	18	No Trend
	DW14	HU-B	17	100	-60	Downward Trend
	DW18	HU-B	21	100	113	Upward Trend
	DW21	HU-A	20	100	-128	Downward Trend
	DW22R	HU-B	12	92	0	No Trend
Cadmium	DW17	HU-B	11	55	31	Upward Trend
Th-230	B16W06S	HU-A	8	88	-10	No Trend
	B16W08S	HU-A	9	67	3	No Trend
	B16W12S	HU-A	15	60	-21	No Trend
	DW21	HU-A	16	63	-10	No Trend
Total U	B16W08S	HU-A	9	67	16	No Trend
	B16W12S	HU-A	15	100	27	No Trend
	DW19	HU-B	23	100	-21	No Trend

[a] N is the number of unfiltered ground-water sample results for a particular analyte at the well for the period between January 2000 and December 2013. For DW17, the dataset was restricted to the period between January 2002 and December 2013 in order to meet the Mann-Kendall Trend Test requirement that the dataset have a detection frequency greater than 50 percent.

[b] DF = Detection Frequency (percent)

[c] S = the Mann-Kendall S-Statistic

[d] One-tailed Mann-Kendall Trend Tests were performed at a 95 percent level of confidence. For non-radiological data, non-detected results were replaced with 0.5 of the lowest detection limit.

For arsenic, two HU-A wells (B16W06S and DW21) and four HU-B wells (B16W09D, DW14, DW18, and DW22R) were evaluated using the Mann-Kendall Trend Test. The Mann-Kendall Trend Test indicated a decreasing trend in arsenic concentrations for the two HU-A wells (B16W06S and DW21). Based on the results of the Mann-Kendall trend analyses conducted for HU-B ground water, one well (DW18) exhibits a statistically significant upward trend in arsenic concentrations and one well (DW14) exhibits a statistically significant downward trend. Figure VI-2 presents the time-versus-concentration plots for arsenic in DW18. Continued sampling will be necessary to determine if ongoing remedial actions will eventually result in a decrease in arsenic concentrations in the ground-water samples from this well. The samples from the remaining two HU-B wells (B16W09D and DW22R) show no trends.

For cadmium, one HU-B well (DW17) was evaluated using the Mann-Kendall Trend Test. Figure VI-2 presents the time-versus-concentration plot for cadmium in DW17. Based on the plot, the cadmium concentration was stable until August 2008, when it increased to the maximum reported value for this well (15.8 µg/L). The best-fit trend line for this review period (2009 to 2013) suggests that the cadmium concentration is gradually decreasing. When the potential error in measurements is taken into account, the latest cadmium result (5.7 µg/L in March 2012) does not exceed the IL (5 µg/L).

The Mann-Kendall Trend Test results indicate there are no concentration trends for Th-230 in the four HU-A wells evaluated. For total U, two HU-A wells (B16W08S and B16W12S) and one HU-B well (DW19) were evaluated. The Mann-Kendall Trend Test indicated no concentration trends for total U in SLDS ground water.

LATTY AVENUE PROPERTIES

The Latty Avenue Properties include the HISS, Futura, and eight Latty Avenue VPs (VPs 01[L] through 06[L], and 40A (partial), and Parcel 10K530087). The ground-water monitoring wells at the Latty Avenue Properties are located on or immediately adjacent to the HISS and Futura. The locations of the ground-water monitoring wells at the Latty Avenue Properties are shown on Figure VI-3.

Stratigraphy

Four HZs (HZ-A through HZ-C and HZ-E) are present at the HISS. These HZs are identified in the conceptual model of ground-water flow shown on Figure III-10. These HZs are the shallow HZ-A, comprising the Unit 1 fill, Unit 2 loess, and Subunit 3T silty clay; the intermediate depth HZ-B, comprising the Subunit 3M clay; the deep HZ-C, comprising the Subunit 3B silty clay and Unit 4 clayey to sandy gravel; and the protected deep HZ-E, comprising the Mississippian Limestone. The stratigraphy beneath the HISS is similar to that found at the SLAPS, with the exception that the shale unit (HZ-D) encountered at the SLAPS is absent at the HISS. HZ-A and HZ-B are often referred to as the upper zone, while HZ-C and HZ-E are referred to as the lower zone. With the exception of monitoring wells HISS-5D and HW23, which were screened in the HZ-C, all of the monitoring wells at the HISS are screened in the HZ-A.

Sampling Program

As part of this five-year review, ground-water data are evaluated to identify if any sustained COC concentrations are above the ground-water monitoring guidelines. The ground-water monitoring data for the Latty Avenue Properties are evaluated against two types of ground-water monitoring guidelines identified in the NC ROD (USACE 2005a): (1) response-action monitoring guidelines and (2) a total U monitoring guideline of 30 µg/L (which is used for both response-action and long-term monitoring). In addition, an evaluation of concentration trends is conducted for soil COCs detected above NC ROD ground-water guidelines to assess whether concentrations of the COCs are increasing (upward trending) or decreasing (downward trending) over time. If ground-water monitoring indicates the presence of COCs at significantly increased concentrations and total U significantly above 30 µg/L, and it is determined that significant degrading of CWC surface water may occur, an evaluation of potential response actions would be conducted.

In CY 2009, ground-water sampling was conducted at eleven ground-water monitoring wells (nine HZ-A and two HZ-C) at the Latty Avenue Properties. Four inorganic soil COCs (barium, chromium, molybdenum, and nickel) and four radiological analytes (U-234, U-235, U-238, and total U) were detected at concentrations above the NC ROD criteria in HZ-A ground water. Based on the CY 2009 results and associated measurement errors, no exceedances were noted for radiological or inorganic analytes in the HZ-C ground-water samples.

During CY 2010, nine ground-water monitoring wells (eight HZ-A and one HZ-C) were sampled at the Latty Avenue Properties. Two inorganic soil COCs (molybdenum and nickel) and three radiological analytes (U-234, U-238, and total U), were detected at concentrations above the NC ROD criteria in HZ-A ground water. When measurement error is taken into account, concentrations of all radiological and inorganic soil COCs were below the NC ROD ground-water guidelines in HZ-C ground-water samples collected in CY 2010.

During CY 2011, nine ground-water monitoring wells (eight HZ-A and one HZ-C) were sampled at the Latty Avenue Properties. Based on an evaluation of the CY 2011 ground-water data, one inorganic soil COC (selenium) and three radiological analytes (U-234, U-238, and total U) were

detected at concentrations above the NC ROD guidelines in HZ-A ground water at the Latty Avenue Properties. No exceedances were noted for radiological or inorganic analytes in the HZ-C well samples.

Seven ground-water monitoring wells were decommissioned at the Latty Avenue Properties in CY 2011. Two of these wells, HISS-06 (HZ-A) and HISS-05D (HZ-C), were decommissioned because they had become damaged during remediation activities conducted at the HISS in early CY 2010. A replacement well for HISS-06 (HISS-06A) was installed in February 2011. In addition, a new monitoring well, HISS-11A, was installed to allow for interim monitoring immediately downgradient of Futura Building 4. HISS-11A was installed near the former location of HISS-11. Both HISS-06A and HISS-11A are screened across HZ-A. Five additional HZ-A wells (HISS-09, HISS-14, HISS-15, HISS-18S, and HW21) were decommissioned in CY 2011 because they were no longer needed for response-action monitoring.

Ground-water sampling was conducted at six ground-water monitoring wells (five HZ-A and one HZ-C) at the Latty Avenue Properties during CY 2012. Based on an evaluation of the CY 2012 ground-water data, three radiological analytes (U-234, U-238, and total U) were detected at concentrations above the NC ROD guidelines in HZ-A ground water at the Latty Avenue Properties. No exceedances were noted for inorganic analytes in the HZ-A well samples. All sample results were below the NC ROD ground-water guidelines in HZ-C ground-water samples collected in CY 2012.

During CY 2013, seven ground-water monitoring wells (six HZ-A and one HZ-C) were sampled at the Latty Avenue Properties. Based on an evaluation of the CY 2013 ground-water data and associated measurement errors, one inorganic soil COC (molybdenum) and three radiological analytes (U-234, U-238, and total U) were detected at concentrations above the NC ROD guidelines in HZ-A ground water at the Latty Avenue Properties. Based on the CY 2013 results and associated measurement errors, no exceedances were noted for radiological or inorganic analytes in the HZ-C well samples.

In summary, during the period of this review (January 2009 through December 2013), exceedances of the NC ROD ground-water guidelines were noted for five inorganic soil COCs (barium, chromium, molybdenum, nickel, and selenium) and four radiological soil COCs (U-234, U-235, U-238, and total U) in HZ-A ground water at the HISS. As of December 2013, the end of this five-year review period, the concentrations of one of the inorganic soil COCs (molybdenum) and three of the radiological COCs (U-234, U-238, and total U) had exceeded the NC ROD guidelines for a period of at least 12 months in HZ-A ground water. Based on the CWC sampling data, a significant degrading of CWC surface water has not occurred. Therefore, there has been no finding of significantly degraded ground-water conditions at the HISS. Based on an evaluation of the CY 2009 through CY 2013 ground-water data and associated measurement errors, no radiological or inorganic COCs have exceeded the NC ROD guidelines in HZ-C through HZ-E ground water at the HISS. The lack of exceedances of the NC ROD guidelines in HZ-C ground water documents protection of the underlying limestone aquifer (HZ-E).

Trend Analysis

A Mann-Kendall statistical trend analysis was conducted to determine if concentrations of soil COCs are increasing or decreasing over time in ground water at the HISS. The test was performed for the wells for which the concentration of a soil COC exceeded its respective NC ROD monitoring guideline during the period of this review (2009 through 2013) and for which sufficient detected results were available to evaluate a trend (i.e., a detection frequency

greater than 50 percent). The following soil COCs exceeded their NC ROD monitoring guidelines in HISS ground water during the period of this review:

- Barium (HISS-06)
- Chromium (HISS-06)
- Molybdenum (HISS-01, HISS-06, HISS-10, and HW21)
- Nickel (HISS-06 and HISS-18S)
- Selenium (HISS-06A)
- Vanadium (HW23)
- U-234 (HISS-01, HISS-06, and HISS-10)
- U-235 (HISS-06)
- U-238 (HISS-01, HISS-06, and HISS-10)
- Total U (HISS-01 and HISS-06)

Mann-Kendall trend analysis was not conducted for chromium in HISS-06 or molybdenum in HW21 due to low detection frequency. Because the total U values are calculated using the U-234 and U-238 values, the trends in their values should be the same as the total U trend results. Therefore, it was unnecessary to perform a separate trend analysis for each of these isotopes. The results of the Mann-Kendall Trend Test are summarized in Table VI-5. Figure VI-4 includes time-versus-concentration plots for those wells for which the Mann-Kendall Trend Test identified a significant trend.

Table VI-5. Results of Mann-Kendall Trend Test for HISS Ground Water

Analyte	Station	Hydrogeologic Unit	N[a]	DF[b]	S[c]	Trend[d]
Barium	HISS-06[e]	HZ-A	11	100	-6	No Trend
Molybdenum	HISS-01	HZ-A	21	76	18	No Trend
	HISS-06[e]	HZ-A	11	82	26	Upward Trend
	HISS-10	HZ-A	9	67	13	No Trend
Nickel	HISS-06[e]	HZ-A	11	64	13	No Trend
	HISS-18S[f]	HZ-A	8	75	21	Upward Trend
Selenium	HISS-06A[e]	HZ-A	6	100	-9	No Trend
Vanadium	HW23	HZ-C	22	59	34	No Trend
Total U	HISS-01	HZ-A	28	100	128	Upward Trend
	HISS-06[e]	HZ-A	12	100	20	No Trend
	HISS-10	HZ-A	14	100	41	Upward Trend[g]

[a] N is the number of unfiltered ground-water sample results for a particular analyte at the well for the period between January 2000 and December 2013. For HISS-10, the dataset was restricted to the period between January 2003 and December 2013 in order to meet the Mann-Kendall Trend Test requirement that the dataset have a detection frequency greater than 50 percent.

[b] DF = Detection Frequency (percent)

[c] S = the Mann-Kendall S-Statistic

[d] One-tailed Mann-Kendall Trend Tests were performed at a 95 percent level of confidence. For non-radiological data, non-detected results were replaced with 0.5 of the lowest detection limit.

[e] HISS-06 was decommissioned in CY 2010. A replacement well (HISS-06A) was installed in CY 2011.

[f] HISS-18S was decommissioned in CY 2011

[g] HISS-10 exceeded the NC ROD guidelines for U-234 and U-238, but did not exceed the guideline for total U.

Concentrations of nickel in HISS-18S appear to be increasing, based on the results of the Mann-Kendall Trend Test. However, the statistical Mann-Kendall Trend Test does not take into consideration the range of error inherent in the analytical measurements. When the potential error in measurements is taken into account, the range of error associated with the nickel concentrations in HISS-18S is wider than the magnitude of the trend, as shown by the trend line

in the time-versus-concentration plot on Figure VI-4. This indicates that the determination of an overall trend for nickel in HISS-18S is inconclusive.

An increasing trend in molybdenum concentrations was observed for HISS-06 for CY 2000 through CY 2009, based on the Mann-Kendall Trend Test. Because no ground-water sampling data are available for HISS-06 after November 2009, sampling data collected at its replacement well, HISS-06A, is used to assess the molybdenum concentrations in this area for the remainder of this five-year review period. As shown in the time-versus-concentration plot of molybdenum concentrations at HISS-06 and HISS-06A (Figure VI-4), the molybdenum concentrations detected between March 2011 and August 2013 at HISS-06A are lower than the concentrations detected at HISS-06 and do not show any trend.

Based on the results of the Mann-Kendall Trend Test, an increasing trend in total U concentrations at HISS-01 is indicated for the CY 2000 through CY 2013 period. Although the Mann-Kendall Trend Test indicated an overall increasing trend, total U concentrations at HISS-01 show a decreasing trend during this five-year review period, from a high of 337 µg/L on May 29, 2009, to 56.5 µg/L on August 28, 2013. As shown on Figure VI-4, the total U concentrations in HISS-01 increased during CY 2008 and CY 2009, likely in response to the remedial action being conducted at the HISS at that time. The total U concentrations have since declined to levels that are slightly above the 30 µg/L NC ROD guideline. The Mann-Kendall Trend Test and the time-versus-concentration plot on Figure VI-4 indicate an increasing trend in total U concentrations at HISS-10 for the CY 2000 through CY 2013 period. However, the total U concentrations at HISS-10 have not exceeded the NC ROD guideline of 30 µg/L during this period.

SLAPS AND SLAPS VPs

Stratigraphy

There are five HZs recognized beneath the SLAPS and its adjacent VPs. These HZs are identified in the conceptual model of ground-water flow for the SLAPS shown on Figure III-10. These HZs are the shallow HZ-A, comprising the Unit 1 fill, Unit 2 loess, and Subunit 3T silty clay; the intermediate depth HZ-B, comprising the Subunit 3M clay; the deep HZ-C, comprising the Subunit 3B silty clay and Unit 4 clayey to sandy gravel; HZ-D, comprising the interbedded Pennsylvanian rock and shale; and the protected deep HZ-E, comprising the Mississippian Limestone. HZ-A and HZ-B are often referred to as the upper zone, while HZ-C, HZ-D, and HZ-E are referred to as the lower zone. Although the ground-water monitoring well network extends beyond the borders of the SLAPS to its associated VPs, the network is referred to as the SLAPS monitoring well network. The locations of the ground-water monitoring wells at the SLAPS are shown on Figure VI-5.

Sampling Program

The ground-water monitoring data for the SLAPS and SLAPS VPs are evaluated against the response-action monitoring guidelines and total U monitoring guideline identified in the NC ROD (USACE 2005a). As part of this five-year review, an evaluation of concentration trends has been conducted for the COCs detected above NC ROD ground-water monitoring guidelines to assess if ground-water conditions have significantly degraded.

During CY 2009, 11 ground-water monitoring wells were sampled at the SLAPS and SLAPS VPs. Nine of the wells are screened in HZ-A and two of the wells are screened in HZ-C. Four inorganic analytes (chromium, molybdenum, nickel, and selenium) and one radiological analyte (total U) were detected in HZ-A ground water at concentrations above the NC ROD criteria at the SLAPS and SLAPS VPs. However, molybdenum and selenium did not exceed

their NC ROD criteria when the associated measurement error was taken into account. Chromium and nickel were detected in B53W13S, located in the Ballfields at concentrations above their NC ROD criteria during the first two sampling events of CY 2009, but decreased to levels below their NC ROD criteria during the third quarter sampling event. Total U concentrations exceeded the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the SLAPS. No soil COCs exceeded the NC ROD criteria in HZ-C through HZ-E ground water.

During CY 2010, 12 ground-water monitoring wells were sampled at the SLAPS and SLAPS VPs. Nine wells are screened in HZ-A and three wells are screened across HZ-C through HZ-E ground water. Two inorganic soil COCs, chromium and nickel, were above the NC ROD ground-water guidelines in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2010, if the associated measurement errors are taken into account. Total U concentrations were above the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the SLAPS. Concentrations of two soil COCs (cadmium and chromium) were above the NC ROD ground-water guidelines in HZ-C through HZ-E ground water at the SLAPS and SLAPS VPs. However, cadmium does not exceed its NC ROD guideline if the associated measurement error is taken into account. Chromium concentrations exceeded the NC ROD guideline in one well, but these concentrations did not exceed the NC ROD guideline for a period of at least 12 months.

During CY 2011, 10 ground-water monitoring wells (eight HZ-A wells and two HZ-C through HZ-E wells) were sampled at the SLAPS and SLAPS VPs. Based on an evaluation of the CY 2011 ground-water data and associated measurement errors, three soil COCs (chromium, nickel, and total U) were above the NC ROD ground-water guidelines in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2011. Total U concentrations were above the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the SLAPS and were above the guideline for a period of at least 12 months. No soil COCs exceeded the NC ROD criteria in HZ-C through HZ-E ground water in CY 2011.

During CY 2012, 12 ground-water monitoring wells (10 HZ-A wells and 2 HZ-C through HZ-E wells) were sampled at the SLAPS and SLAPS VPs. Three inorganic soil COCs (chromium, molybdenum, and nickel) were above the NC ROD guidelines in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2012, if the associated measurement errors are taken into account. Only two of these inorganic contaminants (chromium at B53W09S and nickel at B53W13S) were above the NC ROD guidelines for a period of at least 12 months. Total U concentrations were above the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the SLAPS and have been above the guideline for a period of at least 12 months. No soil COCs exceeded the NC ROD criteria in HZ-C through HZ-E ground water in CY 2012.

During CY 2013, 13 ground-water wells (10 HZ-A wells and 3 HZ-C through HZ-E wells) were sampled at the SLAPS and SLAPS VPs. Four soil COCs (chromium, molybdenum, nickel, and total U) were above the NC ROD guidelines in HZ-A ground water at the SLAPS and SLAPS VPs. However, molybdenum did not exceed NC ROD guidelines if the associated measurement errors are taken into account. Total U concentrations were above the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the SLAPS and have been above the guideline for a period of at least 12 months. One soil COC, nickel, exceeded the NC ROD guideline in HZ-C through HZ-E ground water in CY 2013. However, the nickel concentration did not exceed its NC ROD guideline if the associated measurement error is taken into account.

In summary, during the period of this review (January 2009 through December 2013), exceedances of the NC ROD ground-water guidelines were noted for three inorganic soil COCs (chromium, molybdenum, and nickel) and two radiological soil COCs (U-238 and total U) in HZ-A ground water at the SLAPS and SLAPS VPs, when the associated measurement error is taken into

account. As of December 2013, the end of this five-year review period, the concentrations of two of the inorganic soil COCs (chromium and nickel) and one of the radiological COCs (total U) had exceeded the NC ROD guidelines for a period of at least 12 months in HZ-A ground water. Based on the CWC sampling data, a significant degrading of CWC surface water has not occurred. Therefore, no finding of significantly degraded ground-water conditions currently exists at the SLAPS or SLAPS VPs. Comparison of the data to the NC ROD guidelines indicates that concentrations of one COC, chromium, was above the NC ROD guideline in HZ-C through HZ-E ground water if the associated measurement errors are taken into account. No soil COCs exceeded the NC ROD guidelines for a period of at least 12 months in HZ-C through HZ-E ground water at the SLAPS or SLAPS VPs. The lack of exceedances of the total U guideline in HZ-C through HZ-E ground water documents protection of the limestone aquifer (HZ-E).

Trend Analysis

A Mann-Kendall statistical trend analysis was conducted for wells for which the concentration of a COC exceeded its respective NC ROD monitoring guideline during the period of this review (2009 through 2013). The Mann-Kendall Trend Test does not consider the effects of measurement error, so time-versus-concentration plots (shown on Figure VI-6) were used to evaluate the validity of the Mann-Kendall results. The following soil COCs exceeded their NC ROD monitoring guidelines in SLAPS ground water during the period of this review:

- Cadmium (PW35)
- Chromium (B53W01D, B53W06S, B53W09S, B53W13S, and B53W18S)
- Molybdenum (B53W13S and B53W18S)
- Nickel (B53W07D, B53W09S, B53W13S, PW43, PW45, and PW46)
- Selenium (B53W07S)
- U-238 (B53W19S)
- Total U (PW46)

Because concentrations have been consistently low and the incidence of non-detection high (above 50 percent), a trend analysis was not performed for the following analytes: cadmium in PW35; chromium in B53W01D; nickel in B53W07D, PW43, and PW46; selenium in B53W07S; and U-238 in B53W19S. In addition, a trend analysis was not performed for molybdenum in B53W13S, because concentrations have been consistently low and have not exceeded the NC ROD monitoring guideline during the period of this review if associated measurement errors are taken into account. The results of the Mann-Kendall Trend Test are summarized in Table VI-6.

Table VI-6. Results of Mann-Kendall Trend Test for SLAPS Ground Water

Analyte	Station	Hydrogeologic Unit	N[a]	DF[b]	S[c]	Trend[d]
Chromium	B53W06S	HZ-A	13	92	32	Upward Trend
	B53W09S	HZ-A	15	80	56	Upward Trend
	B53W13S	HZ-A	20	90	129	Upward Trend
	B53W18S	HZ-A	15	80	54	Upward Trend
Molybdenum	B53W18S	HZ-A	15	80	30	No Trend

Table VI-6. Results of Mann-Kendall Trend Test for SLAPS Ground Water (Continued)

Analyte	Station	Hydrogeologic Unit	N[a]	DF[b]	S[c]	Trend[d]
Nickel	B53W09S	HZ-A	15	73	29	No Trend
	B53W13S	HZ-A	20	80	117	Upward Trend
	PW45	HZ-A	12	83	-19	No Trend
Total U	PW46	HZ-A	14	100	5	No Trend

[a] N is the number of unfiltered ground-water sample results for a particular analyte at the well for the period between January 2000 and December 2013.

[b] DF = Detection Frequency (percent)

[c] S = the Mann-Kendall S-Statistic

[d] One-tailed Mann-Kendall Trend Tests were performed at a 95 percent level of confidence. For non-radiological data, non-detected results were replaced with 0.5 of the lowest detection limit.

A Mann-Kendall trend analysis was conducted for four HZ-A wells yielding at least one sample showing chromium exceeding NC ROD monitoring guidelines since January 2009. The Mann-Kendall results indicate that all four of these wells have statistically significant increasing trends for chromium. In addition, an increasing trend in nickel concentrations was observed for B53W13S for CY 2000 through CY 2013, based on the Mann-Kendall Trend Test. The time-versus-concentration graphs for chromium and nickel are shown on Figure VI-6. Based on the CWC sampling data, there are no corresponding concentration trends observed in CWC surface water. The chromium concentrations have remained at non-detect levels and nickel concentrations have remained low in CWC surface water. The elevated concentrations of chromium and nickel may be localized occurrences due, at least in part, to the corrosion of stainless steel casings and/or screens. However, the data are inconclusive. Other factors could be responsible for the elevated results, including, but not limited to, increased amounts of fine-grained sediments suspended in samples, the timing of nearby remediation activities, metal desorption from soil due to changes in geochemical conditions, or a combination of these and other factors. In response to these results, the sampling frequencies for these wells have been increased and both filtered and unfiltered samples are being collected in order to provide additional data to assess the potential causes of the increasing trends. If the data indicate well corrosion as a likely cause, monitoring well rehabilitation techniques or, in extreme cases, well decommissioning and/or replacement, may be considered.

The highest total U concentrations at the SLAPS during the period of this review were reported for PW46 at the western edge of the SLAPS. PW46 is a remedial action evaluation well that was installed in April 2006. Based on the statistical evaluation of trends, no increases in the concentrations of total U have occurred in PW46 over the period of this review. A time-versus-concentration graph for PW46 is shown on Figure VI-6. Although no ground-water sampling data are available for PW46 prior to May 18, 2006, data are available for the previous well at this location, PW38. Based on the total U data collected in PW38 prior to its decommissioning in November 2003, the total U concentrations at PW46 are lower than those reported at PW38.

Excavation-Water and Storm-Water Discharge Monitoring

This section provides a description of the excavation-water and storm-water monitoring activities conducted at the SLS during this five-year review period. The monitoring results obtained from these activities are presented and compared with their respective permit or permit-equivalent requirements. The purpose of excavation-water and storm-water discharge sampling at the SLS is to monitor compliance with the established discharge requirements. These requirements are established by the following: MSD discharge authorization letters dated 1998, 2001, 2004, 2006, 2008, 2010, and 2012 for the SLDS (MSD 1998, 2001a, 2004, 2006a, 2008a, 2010a, 2012a); MDNR National Emission Standards for Hazardous Air Pollutants (NPDES)-equivalent document

dated October 2, 1998 (MDNR 1998); and MSD discharge authorization letters dated 2001, 2005, 2006, 2008, 2010, and 2012 for the SLAPS (MSD 2001b, 2005, 2006b, 2008b, 2010b, 2012b).

Excavation-Water Discharge Monitoring at the SLDS

Precipitation run-on and ground-water infiltration that collect in excavation areas of the SLDS are treated and discharged to the Bissell Point Sewage Treatment Plant under an authorization letter issued by the MSD. The MSD establishes a maximum volume of excavation water allowed to be discharged in a 24-hour period, and requires that the USACE show compliance of the treated excavation water with applicable standards and limits before MSD will allow the discharge.

Excavation water is discharged to MSD sewer inlets located at the SLDS. A summary of the excavation-water discharges from the SLDS for this five-year review period is presented in Table VI-7.

Table VI-7. Summary of Excavation-Water Discharges at the SLDS

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total Activity Discharged	Total Volume Discharged (gallons)
2009	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 1.0E-05 Ci U – 2.8E-04 Ci Ra – 3.4E-06 Ci	875,934
2010	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 2.7E-05 Ci U – 3.5E-03 Ci Ra – 1.11E-05 Ci	1,970,228
2011	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 2.9E-05 Ci U – 4.5E-05 Ci Ra – 8.1E-06 Ci	1,286,137
2012	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 4.7E-06 Ci U – 3.3E-05 Ci Ra – 3.0E-06 Ci	572,799
2013	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 4.2E-05 Ci U – 1.8E-03 Ci Ra – 1.3E-05 Ci	1,675,409

Note:
Ci – curie(s)

Excavation-Water Discharge Monitoring at the North St. Louis County Sites

On July 23, 2001, the MSD responded to a request by the USACE to discharge treated excavation water, following biodenitrification, to an MSD sanitary sewer located onsite by issuing a conditional approval for discharge of treated excavation water that resulted from USACE response actions at the SLAPS. Two-year permit extensions were granted in 2006, 2008, 2010, and 2012, with the current extension remaining in effect until July 23, 2014. The primary condition of the approval was that a treatment system be installed, maintained, and operated to produce an effluent meeting the standards contained in the following: MSD ordinances 8472, 10177, and 10082 (MSD 1991, 1994, and 1997); 10 *CFR* 20; and 19 *Code of State Regulations (CSR)* 20-10.

The MSD limits the annual allocation for radioactivity from the SLAPS to the MSD CWC treatment plant, establishes the maximum volume of excavation water allowed to be discharged in a 24-hour period, and requires that the USACE show compliance of the treated excavation water with applicable standards and limits before MSD will allow the discharge. Also, as part of revising the

discharge limits, a request for a selenium variance was approved on February 10, 2005 (MSD 2005). The selenium variance allows the use of a mass limit rather than a concentration limit. The following result exceeded the selenium mass limit for an excavation-water discharge during:

- CY 2009 – Batch 124, MSD notified on May 5, 2009.

On May 24, 2012, the St. Louis MSD responded with approval to a request by USACE to review and remove the requirement to analyze for barium, lead, and selenium after the first two batches from new investigation areas (MSD 2012b).

No remediation-related discharge of excavation water occurred at the North St. Louis County Sites during the following period: CY 2012 (third quarter).

A summary of the excavation-water discharges from the North St. Louis County Sites for this five-year review period is presented in Table VI-8.

Table VI-8. Summary of Excavation-Water Discharges at the North St. Louis County Sites

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total Activity Discharged	Total Volume Discharged (gallons)
2009	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 6.2E-05 Ci U – 3.0E-04 Ci Ra – 1.2E-05 Ci	2,792,594
2010	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 2.1E-05 Ci U – 8.6E-05 Ci Ra – 9.1E-06 Ci	2,064,746
2011	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 1.0E-05 Ci U – 4.7E-05 Ci Ra – 1.0E-05 Ci	2,225,366
2012	No Exceedance	No Exceedance	No Discharge	No Exceedance	Th –1.7E-05 Ci U – 6.5E-05 Ci Ra – 6.0E-06 Ci	1,116,005
2013	No Exceedance	No Exceedance	No Exceedance	No Exceedance	Th – 1.4E-05 Ci U – 4.3E-05 Ci Ra – 6.9E-06 Ci	1,210,380

The USACE owns the HISS on-site laboratory located at 8945 Latty Avenue in Hazelwood, Missouri. The laboratory operates in accordance with an MSD special discharge permit. The laboratory waste water is discharged to the MSD sewer system at Manhole 10K2-075S. HISS laboratory waste water is discharged in accordance with the MSD discharge authorization letter dated January 31, 2012 (MSD 2012c). The MSD special discharge approval requires compliance with applicable discharge regulations (Ordinance 8472) (MSD 1991).

Although many of the compounds are found above laboratory method detection limits, there are no discharge limits or criteria regulating these parameters; the parameters are monitored for permit renewal purposes and submitted to MSD for approval. The permit was successfully renewed every year of this five-year review period (CY 2009 through CY 2013).

Storm-Water Monitoring at HISS/Futura and the Latty Avenue Properties

Historical monitoring of storm-water discharges at the HISS involved storm-water discharge sampling at three outfalls (HN01, HN02, and HN03) under the MDNR NPDES operating permit MO-0111252. This permit for the HISS was terminated per letter from the USACE to Mr. Phillip A. Schroeder, MDNR Permit Chief, dated November 18, 2003 (USACE 2003e).

Starting in April of CY 2007, un-named moving pumping outfalls were utilized during excavation activities at the North St. Louis County Sites for the management of storm water with regard to sediment control and pumped excavation water. The moving outfall was necessary to pump excess excavation water to CWC. The un-named excavation water was pumped to CWC in accordance with agreements made during a March 12, 2007, meeting with Mr. Tom Siegel, MDNR, and as described in a subsequent April 20, 2007, letter from the USACE (USACE 2007d). The excavation-water sampling is being conducted to verify compliance with the NPDES permit-equivalent requirements. The parameters for the un-named outfalls follow the same NPDES parameters as PN02.

During CY 2009, three un-named moving pumping outfalls were utilized during excavation activities at the HISS/Futura, VP-02(L), and VP-40A (partial) for the management of storm water with regard to sediment control and pumped excavation water. In CY 2009, all NPDES permit-specific samples were in compliance with permit-equivalent requirements.

In CY 2010, two un-named moving pumping outfalls were utilized during excavation activities at the HISS/Futura and VP-02(L). All NPDES permit-specific samples were in compliance with permit-equivalent requirements.

During CY 2011, two un-named moving pumping outfalls were utilized during excavation activities at the HISS/Futura and VP-02(L). All NPDES permit-specific samples were in compliance with permit-equivalent requirements.

No outfalls were utilized or sampled in CY 2012 or CY 2013.

Storm-Water Discharge Monitoring at the SLAPS

Historical monitoring of storm-water discharges at the SLAPS involved semiannual sampling of the effluent from two outfalls. The first of the SLAPS historical outfalls (STW-001) was located at the northwest entrance to the site, and the second historical outfall (STW-002) was located in the southwest corner of the site.

In an NPDES-equivalent document dated October 2, 1998, the MDNR established storm-water discharge requirements for three outfalls at the SLAPS in conjunction with the proposed construction of the sedimentation basin. These three storm-water discharge outfalls at the SLAPS replaced the historical outfalls and were designated as Outfall PN01, Outfall PN02, and Outfall PN03. Outfall PN01 is located at the termination of the drainage feature that conveys storm water along the south side of McDonnell Boulevard to CWC. Outfall PN01 actually consists of two separate outfalls. Outfall PN01a is the discharge point for the sedimentation basin, and Outfall PN01b is the discharge point for the emergency spillway. Outfall PN01b is located near historical Outfall STW-001. In May 2008, the USACE notified the MDNR that the monitoring of Outfall PN01 was terminated due to the completion of remedial actions at the SLAPS (USACE 2008d). Outfall PN02 is located at the termination of a drainage feature that conveys storm water along the north side of McDonnell Boulevard to CWC. On February 19, 2002, the MDNR issued a letter to the USACE conditionally agreeing with a request to reduce the sampling frequency at PN02 to once per year, effective February 2002 until the drainage area becomes affected by soil disturbance such as excavation (MDNR 2002). On November 26, 2013, the sampling frequency at PN02 returned to monthly due to the remedial activities at the Ballfields (IA-09). Outfall PN03 was discontinued as a sampling location in accordance with a letter from the MDNR dated February 19, 2002 (MDNR 2002).

As previously described, starting in April of CY 2007, un-named moving pumping outfalls were utilized during excavation activities at North St. Louis County Sites for the management of storm water with regard to sediment control and pumped excavation water. The moving outfall was necessary to pump excess excavation water to CWC. The un-named excavation water was pumped to CWC in accordance with agreements made during a March 12, 2007, meeting with Mr. Tom Siegel, MDNR, and as described in a subsequent April 20, 2007, letter from the USACE (USACE 2007d). The excavation-water sampling is being conducted to verify compliance with the NPDES permit-equivalent requirements. The parameters for the un-named outfalls follow the same NPDES parameters as PN02.

During CY 2009, storm-water monitoring was conducted at one SLAPS outfall location, Outfall 002 (PN02). All NPDES permit-specific sample results from the SLAPS were in compliance with NPDES permit-equivalent requirements.

In CY 2010, storm-water monitoring was conducted at Outfall PN02. Three un-named moving pumping outfalls were utilized during excavation activities at the Hazelwood Avenue ROW, McDonnell Boulevard, and VP-12. All NPDES permit-specific sample results from the SLAPS were in compliance with NPDES permit-equivalent requirements.

During CY 2011, storm-water monitoring was conducted at Outfall PN02. One un-named moving pumping outfall was utilized during excavation activities at McDonnell Boulevard. All NPDES permit-specific sample results from the SLAPS were in compliance with NPDES permit-equivalent requirements.

In CY 2012, two un-named moving pumping outfalls were utilized during excavation activities at the Ballfields (IA-09) and the Eva Loadout Facility (VP-16). All NPDES permit-specific sample results from the SLAPS un-named moving pumping outfalls were in compliance with NPDES permit-equivalent requirements. Outfall PN02 was scheduled for annual sampling during the fourth quarter; however, a rain event did not occur.

During CY 2013, storm-water monitoring was conducted at one SLAPS outfall location, Outfall PN02. All NPDES permit-specific sample results from the SLAPS were in compliance with NPDES permit-equivalent requirements.

Site Radiological Monitoring

Program Overview (SLDS)

Site radiological monitoring consisted of collecting gamma radiation, airborne particulate radionuclide, and outdoor and indoor airborne radon data. The data were used to evaluate the compliance status of each site with ARARs, to evaluate trends, and to assess the magnitude of radiological exposures to the general public, as appropriate.

Applicable Standards

Title 40 CFR *192.02(b)(2)*

Outdoor airborne radon was compared to the regulatory criterion of 0.5 pCi/L average annual concentration above background, as listed in 40 *CFR* 192.02(b)(2).

Title 40 CFR *61*

Airborne particulate radionuclide data from the site were used to calculate the effective dose equivalent (EDE) to a critical receptor. The National Emission Standards for Hazardous Air Pollutant (NESHAP) standard of EDE to a critical receptor from radionuclide emissions is

10 mrem/yr, as stated in 40 *CFR* 61, Subpart I *(National Emission Standards for Emissions of Radionuclides Other Than Radon From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered By Subpart H).*

Evaluation Criteria

Title 10 CFR *20*

The regulatory dose limit for members of the public is 100 mrem/yr from all pathways, as stated in 10 *CFR* 20.1301. Although 10 *CFR* 20.1301 is not an ARAR for the SLDS, the USACE has provided this evaluation to assess public exposures from FUSRAP cleanup operations. Achievement of the dose limit in 10 *CFR* 20.1301 can be demonstrated in one of the following two ways, as described in §20.1302(b)(1) and (2).

1. Demonstrating by measurement or calculation that the total effective dose equivalent (TEDE) to the individual likely to receive the highest dose from the SLDS operations does not exceed the annual dose limit (100 mrem/yr).
2. Demonstrating that (*i*) the annual average concentration of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area does not exceed the values specified in Table 2 of Appendix B to Part 20 and (*ii*) if an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 2 millirem (mrem) per hour.

Gamma radiation, airborne particulate radionuclide, and outdoor airborne radon data from the site were used to evaluate the cumulative dose to a hypothetically impacted individual (member of the public) from exposure to radiological contaminants at the SLDS in order to demonstrate achievement of the 10 *CFR* 20.1301 dose limit.

Prior to CY 2007, measured outdoor air radon concentrations were also compared to the regulatory criterion of 0.3 pCi/L (at 30 percent equilibrium) average annual concentration above background, as listed in 10 *CFR* 20, Table 2 of Appendix B. The USACE has stopped comparing outdoor air radon results to the regulatory criterion listed in 10 *CFR* 20, Table 2, Appendix B, because it is not identified as an ARAR in the SLDS ROD. Currently, as discussed previously, outdoor air radon concentrations are compared to the ARAR value of 0.5 pCi/L average annual concentration above background, as listed in 40 *CFR* 192.02(b).

Gamma Radiation Monitoring

Monitoring Overview

Gamma radiation was measured using thermoluminescent dosimeters (TLDs). TLDs at the SLDS were located at areas assumed to be representative of areas accessible to the public. At each monitoring station, the TLDs were placed approximately 3 ft (0.9 m) above the ground surface inside a housing shelter. The TLDs were collected quarterly and sent to an off-site vendor for analysis. Gamma radiation monitoring was performed at the SLDS at four locations during CY 2009 through CY 2013.

Monitoring Program Results

The gamma radiation data collected from each location during CY 2009 to CY 2013 were corrected for background, shelter absorption, and fade and were normalized to exactly 1 year to calculate an annual dose. The corrected annual gamma radiation monitoring results are presented in Table VI-9.

Table VI-9. External Gamma Radiation Monitoring Results at the SLDS

Monitoring Location	Monitoring Station	CY 2009 TLD Data	CY 2010 TLD Data	CY 2011 TLD Data	CY 2012 TLD Data	CY 2013 TLD Data
		(mrem/yr)				
SLDS	DA-1	2	5	1	0	0
	DA-2	3	8	6	0	2
	DA-3	0	0	1	0	0
	DA-6	0	4	0	0	0

Data Analysis

Gamma radiation data from the SLDS were used to calculate an average dose rate and an annual deep dose equivalent (DDE) to a hypothetically maximally exposed individual. The average dose rate was compared to the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. A summary of calculated gamma radiation dose rates is presented in Table VI-10. The average dose rates determined during CY 2009 to CY 2013 were less than the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. For each CY, the annual dose was added to the radiological doses from other pathways to determine if the TEDE to a member of the public exceeded the 10 *CFR* 20 limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the SLDS and Table VI-16). As shown in Table VI-10, all annual doses for the external gamma pathway are less than the 100 mrem/yr limit for CY 2009 to CY 2013.

Trend Analysis

The annual dose to a member of the public from gamma radiation at the SLDS was far below the 10 *CFR* 20.1302(b)(2)(ii) limit for all years with negligible variance from year to year. There is no trend for the CY 2009 to CY 2013 time period.

Table VI-10. External Gamma Dose Rate at the SLDS

CY	Maximum Average Dose Rate above Background[a]	10 *CFR* 20 Limit (2 mrem/hour)	Annual CY Dose[b]	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/hour)		(mrem/yr)	
2009	<0.1	2	<0.1	100
2010	<0.1	2	<0.1	100
2011	<0.1	2	<0.1	100
2012	<0.1	2	<0.1	100
2013	<0.1	2	<0.1	100

[a] Calculated by dividing the maximum annual gamma radiation result in Table VI-9 by 8,760 hours, the number of hours in a year, for each location.

[b] Although the annual dose to a member of the public from gamma radiation was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to gamma radiation only.

Airborne Particulate Monitoring

Monitoring Overview

Airborne radioactive particulates result from radioactive material in soil (or other sources) that becomes suspended in the air. Airborne radioactive particulates were measured by drawing air through a filter membrane with an air sampling pump placed approximately 3 ft (0.9 m) above the ground and then analyzing the material contained on the filter. The results of the analysis, when compared to the amount of air drawn through the filter, were reported as radioactive contaminant concentrations in microcuries per milliliter (µCi/mL).

Perimeter air sampling for radiological particulates was not conducted at the SLDS during CY 2009 to CY 2013 due to the insignificant potential for material to become airborne at the site. Particulate air monitors were located at excavation and loadout perimeter locations on the SLDS. Air particulate samples are collected during active excavation and waste loadout at the SLDS and analyzed at the SLS radioanalytical laboratory.

Monitoring Program Results

The annual dose was calculated for a hypothetically maximally exposed individual to airborne particulates. The average annual gross alpha and gross beta concentrations and the annual dose rate to a hypothetically maximally exposed individual are presented in Table VI-11.

Table VI-11. Air Particulate Monitoring at the SLDS

CY	Average Annual Gross Alpha Concentration[a] (µCi/mL)	Average Annual Gross Beta Concentration[a] (µCi/mL)	Annual Dose Rate (mrem/yr)
2009	4.8E-15	3.1E-14	<0.1
2010	5.5E-15	2.5E-14	<0.1
2011	4.4E-15	3.2E-14	0.2
2012	3.1E-15	2.8E-14	0.3
2013	3.0E-15	2.6E-14	<0.1

[a] Average annual concentrations are determined using data from all applicable SLDS properties.

Data Analysis

Airborne particulate data were used to calculate radionuclide emission rates to determine if the EDE to a member of the public exceeded the 40 *CFR* 61 standard of 10 mrem/yr. A comparison of the EDE due to airborne particulate radionuclides at the SLDS and the regulatory limits is presented in Table VI-12.

Table VI-12. Airborne Particulate Dose Rate at the SLDS

CY	Annual Dose Rate[a]	40 *CFR* 61 Standard (10 mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/yr)		
2009	<0.1	10	100
2010	<0.1	10	100
2011	0.2	10	100
2012	0.3	10	100
2013	<0.1	10	100

[a] Although the annual dose to a member of the public from airborne particulates was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to airborne particulates only.

As shown in Table VI-12, the annual dose to a member of the public from air particulate radionuclides did not exceed the 40 *CFR* 61 standard of 10 mrem/yr during CY 2009 to CY 2013. For each CY, the estimated EDE was added to the radiological doses from other pathways to determine if the TEDE to a member of the public exceeded the 10 *CFR* 20 limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the SLDS and Table VI-16). However, the EDEs for the airborne particulates pathway are less than the 100 mrem/yr limit for all CYs.

Trend Analysis

The annual dose to a member of the public from airborne particulate radionuclides at the SLDS was far below the 40 *CFR* 61 standard and did not vary significantly from year to year. There is a small downward trend over the time period; however, when compared to the regulatory standard,

the trend is insignificant. The average annual gross alpha and gross beta results demonstrate a slight downward trend over the period as well.

Radon Monitoring

Monitoring Overview

Outdoor airborne radon monitoring was performed at the SLDS using alpha track detectors (ATDs) to measure radon emissions. Outdoor radon monitoring was performed at the SLDS at four locations (DA-1, DA-2, DA-3, and DA-6) during CY 2009 through CY 2013, with the outdoor ATDs having been collocated with the TLDs at the site. The ATDs were collected semi-annually. Outdoor airborne radon concentrations were used to calculate an EDE to a hypothetically maximally exposed individual and were added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Recorded outdoor airborne radon concentrations were also used to calculate a site annual average concentration to compare to the ARAR value of 0.5 pCi/L average annual concentration above background, as listed in 40 *CFR* 192.02(b).

Indoor airborne radon monitoring was performed during CY 2012 and CY 2013 at two SLDS buildings (Building 26 in Plant 1 and the South Storage Building at GSN (DT-4 North). In March of CY 2012, one ATD was placed in each building at a height of 4 ft (1.2 m) (to approximate breathing zone conditions) to measure radon concentrations. The ATDs were located in areas that represent the highest likely exposure from indoor radon. The monitoring of indoor radon at Building 26 in Plant 1 and the South Storage Building at GSN differs from the following recommendation made in Section IX of the Second Five-Year Review Report: The USACE will obtain radon monitoring data for Building 101 from Covidien and forward to the regulators. The USACE will begin radon monitoring at Building 25 starting the first quarter of FY 2011 (USACE 2010a).

The reasons for the deviation are twofold. First, evaluation of indoor air radon monitoring data for Building 101 in Plant 6 is no longer applicable. As discussed in Section IV, demolition of Building 101 began in May 2012, with the demolition of the superstructure having been completed in October 2012. Remediation activities continued with the demolition of the concrete foundation of the building and demolition of abandoned foundations of historical MED/AEC buildings located beneath the building footprint. Remediation of contaminated soils beneath the former structure is ongoing.

Second, soil data collected from beneath the footprint of Building 25 in Plant 1 were evaluated by the USACE during development of the *Remedial Investigation and Baseline Risk Assessment Report for the Inaccessible Soil Operable Unit at the St. Louis Downtown Site* (USACE 2012a). During the data evaluation, the USACE determined that intrusion of radon (i.e., as Rn-222) into the indoor air of Building 25 is not significant as an exposure pathway because of the low concentrations of Ra-226 and Th-230 detected beneath the building footprint (USACE 2011m). Rn-222 is only considered significant as a potential exposure pathway when average Ra-226 concentration levels exceed background levels beneath occupied or habitable buildings by greater than 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil, per 40 *CFR* 192.12(a). Additionally, Th-230 (which decays to Ra-226) is not considered significant unless average Th-230 concentrations above background exceed 14 pCi/g in surface soil and/or 43 pCi/g in subsurface soil, which would result in a buildup of Ra-226 to levels exceeding 40 *CFR* 192.12(a) levels (i.e., 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil) over a 1,000-year period. The average soil concentrations of Ra-226 and Th-230 detected beneath the footprint of Building 25, including background, are less than the surface soil criteria of 5 pCi/g and 14 pCi/g, respectively.

The average soil concentrations of Ra-226 and Th-230 above background were evaluated for all structures located within the ISOU at the SLDS where at least one Ra-226 or Th-230 soil sample result was greater than the surface soil criteria of 5 pCi/g and 14 pCi/g, respectively. Only four structures had average soil concentrations of Ra-226 and Th-230 above background that exceeded the surface soil criteria of 5 pCi/g and 14 pCi/g, respectively. These structures were Building 26 in Plant 1 and the two Salt Storage Domes and the South Storage Building at GSN. The two Salt Storage Domes at GSN were deemed to be not habitable or occupied.

The average soil concentrations of Ra-226 and Th-230 above background detected beneath the footprint of Building 26 are 64 pCi/g and 8.2 pCi/g, respectively. The average soil concentration of Ra-226 above background detected beneath the footprint of the GSN South Storage Building is 13 pCi/g, with the average Th-230 concentration being less than background. ATD locations for monitoring indoor airborne radon concentrations were selected with consideration given to known Ra-226 concentrations under Building 26 and the GSN South Storage Building and to occupancy times at any one location within each building.

Annual average indoor radon data in each applicable building were compared to the 40 *CFR* 192.12(b) ARAR value of 0.02 WL. In accordance with 40 *CFR* 192.12(b), reasonable effort shall be made to achieve, in each habitable or occupied building, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration shall not exceed 0.03 WL. Background indoor radon monitors were not necessary, because the regulatory standard of 0.02 WL includes background. Indoor ATDs were also collected approximately every 6 months and sent to an off-site laboratory for analysis.

Outdoor Airborne Radon Monitoring Program Results

The outdoor airborne radon data collected from each location during CY 2009 to CY 2013 were corrected for background and were normalized to exactly one year to calculate an annual dose rate. The calculated annual outdoor radon monitoring results are presented in Table VI-13.

Table VI-13. Outdoor Airborne Radon Monitoring at the SLDS

Monitoring Location	Monitoring Station[a]	CY 2009 Radon Data	CY 2010 Radon Data	CY 2011 Radon Data	CY 2012 Radon Data	CY 2013 Radon Data
		(pCi/L)				
SLDS	DA-1	0	0	0	0	0
	DA-2	0	0.1	0	0.05	0
	DA-3	0	0.1	0	0	0
	DA-6	0	0.1	0	0	0

[a] Station names and locations may have varied slightly from year to year. The exact location of each station can be found in the annual EMDAR for the respective year.

Analysis of Outdoor Airborne Radon Data

Outdoor airborne radon data from the SLDS were used to calculate an average annual concentration and an annual EDE to a hypothetically maximally exposed individual. The average concentration was compared to the ARAR value of 0.5 pCi/L average annual concentration above background as listed in 40 *CFR* 192.02(b). A summary of the outdoor airborne radon concentrations above background and calculated dose rates is presented in Table VI-14.

Table VI-14. Outdoor Airborne Radon Concentrations and Dose Rates at the SLDS

CY	Average Annual Concentration above Background	40 *CFR* 192.02(b) (0.5 pCi/L)	Annual Dose Rate[a]	10 *CFR* 20 Limit (100 mrem/yr)
	(pCi/L)		(mrem/yr)	
2009	0	0.5	0	100
2010	0	0.5	0.1	100
2011	0	0.5	0.2	100
2012	0.01	0.5	0.1	100
2013	0	0.5	0	100

[a] Although the annual dose to a member of the public from radon was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to outdoor airborne radon only.

As shown in Table VI-14, the average annual concentrations above background during CY 2009 to CY 2013 were less than the 40 *CFR* 192.02(b) value of 0.5 pCi/L. For each CY, the annual dose for the outdoor airborne radon pathway was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the SLDS and Table VI-16). However, as shown in Table VI-14, all annual doses for the outdoor airborne radon pathway are less than the 100 mrem/yr limit.

Trend Analysis of Outdoor Airborne Radon

The annual outdoor airborne radon concentrations at the SLDS were far below the 10 *CFR* 20 limit, with negligible variance from year to year. There was a minute upward trend for dose rates over the time period; however, when compared to the regulatory limit, the trend was insignificant. The average annual concentration of radon remained approximately the same for the period.

Indoor Airborne Radon Monitoring Program Results

The indoor airborne radon data collected from each location during each sampling event in CY 2012 were normalized to exactly one year to calculate radon WLs. The measured semiannual radon concentrations are presented in Table VI-15.

Table VI-15. Summary of Annual Indoor Airborne Radon (Rn-222) Data at the SLDS

Monitoring Location	Monitoring Station	Average Annual Concentration			
		CY 2012		CY 2013	
		Annual Average (pCi/L)[a]	WL[b]	Annual Average (pCi/L)[a]	WL[b]
Plant 1, Building 26	DI-1	1.3	0.005	0.55	0.002
GSN, South Storage Building	DI-2	1.35	0.005	0.70	0.003

[a] Results reported from vendor for two periods are averaged to estimate an annual average radon concentration (pCi/L).

[b] The average annual WL is calculated by dividing the average pCi/L by 100 pCi/L per WL and multiplying by 0.4. The average annual WL must be less than 0.02 (40 *CFR* 192.12(b)).

Analysis of Indoor Airborne Radon Data

The ATDs installed at each monitoring location were collected for analysis after approximately 3 months of exposure, and replaced with another set that would represent radon exposure for the rest of the year. Recorded radon concentrations, listed in pCi/L, were converted to radon WLs using an indoor radon equilibrium factor of 0.4 (NCRP 1988).

The results (including background) were evaluated based on the criteria contained in 40 *CFR* 192.12(b). The average annual indoor airborne radon concentration in each building was determined to be less than the 40 *CFR* 192.12(b) criterion of 0.02 WL. A summary of the calculated WLs for the measured indoor airborne radon is presented in Table VI-15 for Building 26 and the GSN South Storage Building.

Trend Analysis of Indoor Airborne Radon

The annual indoor radon WLs at Building 26 in Plant 1 and the GSN South Storage Building were below the 40 *CFR* 192 limit during both CY 2012 and CY 2013. The annual average concentrations measured in CY 2013, as well as the calculated WLs, are approximately half of the results obtained during CY 2012.

Total Effective Dose Equivalents

The TEDE for each CY (i.e., CY 2009 through CY 2013) was calculated for a maximally exposed individual working outside at the SLDS by summing the annual dose rates estimated for the external gamma pathway, airborne particulates pathway, and the outdoor airborne radon pathway. TEDEs were calculated to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Table VI-16 shows that the pathway-specific dose rates and TEDEs calculated for all CYs are less than the 10 *CFR* 20 dose limit.

The TEDEs do not include the indoor radon exposure pathway. However, indoor radon WLs were determined to be below the 40 *CFR* 192 limit of 0.02 WL for each of the two buildings monitored in CY 2012 and CY 2013.

Table VI-16. Annual Radiological Dose Rates and Total Effective Dose Equivalents Calculated for an Outdoor Worker at the SLDS

CY	Annual Dose Rates (mrem/yr)			TEDE (mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	External Gamma	Airborne Particulates	Outdoor Airborne Radon		
2009	<0.1	<0.1	0	<0.1	100
2010	<0.1	<0.1	<0.1	0.2	100
2011	<0.1	0.2	0	0.2	100
2012	0	0.3	0.1	0.4	100
2013	<0.1	<0.1	0	<0.1	100

Site Radiological Monitoring

Program Overview (SLAPS/SLAPS VPs)

Site radiological monitoring consisted of collecting gamma radiation, airborne particulate radionuclide, and outdoor airborne radon data. The data were used to evaluate the compliance status of each site with ARARs, to evaluate trends, and to assess the magnitude of radiological exposures to the general public, as appropriate. According to the respective EMDARs, radiological air monitoring was conducted as shown in the following list, during each CY.

- CY 2009 – Hazelwood Avenue and VP-38;
- CY 2010 – Hazelwood Avenue, McDonnell Boulevard, VPs 05, 06, 12, 54, 55, and 63, and the SLAPS;
- CY 2011 – McDonnell Boulevard, IA-09, VP-12, VP-31A, and the SLAPS;
- CY 2012 – Ballfields, Eva Loadout, and the SLAPS; and
- CY 2013 – Ballfields, VP-16, and the SLAPS.

Applicable Standards

Title 40 CFR *61.102(a)*

Airborne particulate radionuclide data from the site were used to calculate the EDE to a critical receptor. The NESHAP standard of EDE to a critical receptor from radionuclide emissions is 10 mrem/yr, as stated in 40 *CFR* 61.102(a).

Evaluation Criteria

Title 10 CFR *20*

The regulatory dose limit for members of the public is 100 mrem/yr from all pathways, as stated in 10 *CFR* 20.1301. Title 10 *CFR* 20.1301 is not an ARAR in the NC ROD, but this standard was used as a best management practice (BMP). Achievement of the dose limit in 10 *CFR* 20.1301 can be demonstrated in one of the two following ways, as described in §20.1302(b)(1) and (2).

1. Demonstrating by measurement or calculation that the TEDE to the individual likely to receive the highest dose from SLAPS operations does not exceed the annual dose limit (100 mrem/yr).
2. Demonstrating that (*i*) the annual average concentration of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area does not exceed the values specified in Table 2 of Appendix B to Part 20 and (*ii*) if an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 2 mrem/hour.

Gamma radiation, airborne particulate radionuclide, and outdoor airborne radon data from the site were used to evaluate the cumulative dose to a hypothetically impacted individual (member of the public) from exposure to radiological contaminants at the SLAPS and the SLAPS VPs where excavations occurred in order to demonstrate achievement of the 10 CFR 20.1301 dose limit.

Gamma Radiation Monitoring

Monitoring Overview

Gamma radiation was measured using TLDs. TLDs at the SLAPS were located at the site perimeter. At each monitoring station, the TLDs were placed approximately 3 ft (0.9 m) above the ground surface inside a housing shelter. The TLDs were collected quarterly and sent to an off-site vendor for analysis. Gamma radiation monitoring was performed at the SLAPS at four locations during CY 2009 through CY 2013. Gamma radiation monitoring was not conducted at SLAPS VPs.

Monitoring Program Results

The gamma radiation data collected from each location during CY 2009 to CY 2013 were corrected for background, shelter absorption, and fade, and were normalized to exactly one year for the purpose of comparison to an annual dose. The calculated annual gamma radiation results are presented in Table VI-17.

Table VI-17. External Gamma Radiation Monitoring at the SLAPS

Monitoring Location	Monitoring Station	CY 2009 TLD Data	CY 2010 TLD Data	CY 2011 TLD Data	CY 2012 TLD Data	CY 2013 TLD Data
		(mrem/yr)				
SLAPS	PA-1	0	5	0	3	1
	PA-2	---	12	0	6	11
	PA-3	---	4	0	2	1
	PA-4	0	7	0	5	6
	PA-5	0	---	---	---	---
	PA-6	0	---	---	---	---

Note:

--- Sampling not conducted.

Data Analysis

Gamma radiation data from the SLAPS were used to calculate an average dose rate and an annual DDE to a hypothetically maximally exposed individual. The average dose rate was compared to the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. A summary of the calculated gamma radiation dose rates is presented in Table VI-18.

Table VI-18. External Gamma Dose Rates at the SLAPS

CY	Maximum Average Dose Rate above Background[a]	10 *CFR* 20 Limit (2 mrem/hour)	Annual Dose Rate[b]	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/hour)		(mrem/yr)	
2009	<0.1	2	<0.1	100
2010	<0.1	2	<0.1	100
2011	<0.1	2	<0.1	100
2012	<0.1	2	<0.1	100
2013	<0.1	2	<0.1	100

[a] Calculated by dividing the maximum annual gamma radiation result in Table VI-18 by 8,760 hours, the number of hours in a year, for each location.

[b] Although the annual dose to a member of the public from airborne particulates was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to airborne particulates only.

The average dose rate during CY 2009 to CY 2013 was less than the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. For each CY, the annual dose to a member of the public from gamma radiation was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the SLAPS and SLAPS VPs and Table VI-23). However, as shown in Table VI-18, all annual doses for the external gamma pathway are less than the 100 mrem/yr limit for CY 2009 to CY 2013.

Trend Analysis

The annual dose to a member of the public from gamma radiation at the SLAPS was far below the 10 *CFR* 20 limit for all years, with negligible variance from year to year.

Airborne Particulate Monitoring

Monitoring Overview

Airborne radioactive particulates result from radioactive material in soil (or other sources) that become suspended in the air. Airborne radioactive particulates were measured by drawing air through a filter membrane with an air sampling pump placed approximately 3 ft (0.9 m) above the ground and then analyzing the material contained on the filter. The results of the analysis, when compared to the amount of air drawn through the filter, were reported as radioactive contaminant concentrations in µCi/mL.

Site perimeter air sampling for radiological particulates was conducted at the SLAPS during CY 2009 and CY 2010. During CY 2011 through CY 2013, air sampling for particulate radionuclides was conducted at each active excavation and loadout area at the SLAPS and SLAPS VPs. Air particulate samples were generally collected weekly at the SLAPS and SLAPS VPs and analyzed at the SLS radioanalytical laboratory.

Monitoring Program Results

The annual dose was calculated for a hypothetically maximally exposed individual. The average annual gross alpha and gross beta concentrations and the annual dose rate to a hypothetically maximally exposed individual are presented in Table VI-19.

Table VI-19. Air Particulate Monitoring at the SLAPS/SLAPS VPs

CY	Average Annual Gross Alpha Concentration[a] (µCi/mL)	Average Annual Gross Beta Concentration[a] (µCi/mL)	Annual Dose (mrem/yr)
2009	3.4E-15	3.4E-14	0
2010	5.4E-15	2.5E-14	<0.1
2011	3.2E-15	2.1E-14	<0.1
2012	4.2E-15	2.9E-14	<0.1
2013	3.7E-15	2.8E-14	<0.1

[a] Average annual concentrations are determined using data from all applicable SLAPS properties/SLAPS VPs.

Data Analysis

Airborne particulate data were used to calculate radionuclide emission rates to determine if the EDE to a member of the public exceeded the 40 *CFR* 61 standard of 10 mrem/yr. A comparison of the EDE due to airborne particulate radionuclides at the SLAPS and SLAPS VPs to the regulatory standards is presented in Table VI-20.

Table VI-20. Airborne Particulate Dose Rates at the SLAPS/SLAPS VPs

CY	Annual Dose Rate[a]	40 *CFR* 61.102(a) Standard (10 mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/yr)		
2009	0	10	100
2010	<0.1	10	100
2011	<0.1	10	100
2012	<0.1	10	100
2013	<0.1	10	100

[a] Although the annual dose to a member of the public from airborne particulates was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to airborne particulates only.

As shown in Table VI-20, the annual dose to a member of the public from air particulate radionuclides did not exceed the 40 *CFR* 61 standard of 10 mrem/yr from CY 2009 to CY 2013. For each CY, the estimated EDE was added to the radiological doses from other pathways to determine if the TEDE to a member of the public exceeded the 10 *CFR* 20 limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the SLAPS and SLAPS VPs and Table VI-23). However, as shown in Table VI-20, all EDEs for the airborne particulates pathway are less than the 100 mrem/yr limit for CY 2009 to CY 2013.

Trend Analysis

The annual dose to a member of the public from airborne particulate radionuclides at the SLAPS was below the 40 *CFR* 61.102(a) standard for all years and is negligible. This is likely due to the completion of remediation at the SLAPS in CY 2007 and the subsequent reduction of affected area to create airborne particulate emissions.

Radon Monitoring

Monitoring Overview

Outdoor airborne radon monitoring was performed at the SLAPS using ATDs to measure radon emissions. The detectors were collocated with the TLDs at the site. During CY 2009, ATDs were placed around the site perimeter to measure radon emissions from the site. During CY 2010 and CY 2011, ATDs were placed around the loadout area to measure outdoor radon emissions from the site. During CY 2012 and CY 2013, ATDs were placed around the perimeter of each active

excavation and loadout area. The ATDs were collected semi-annually. Outdoor airborne radon concentrations were used to calculate an EDE to a hypothetically maximally exposed individual and added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Outdoor airborne radon monitoring was performed at the SLAPS at four locations during CY 2009 through CY 2013. Outdoor airborne radon monitoring was not conducted at the SLAPS VPs during CY 2009 through CY 2011.

Monitoring Program Results

The outdoor airborne radon data collected from each location during CY 2009 to CY 2013 were corrected for background and were normalized to exactly one year to calculate an annual dose. The calculated annual outdoor radon monitoring results are presented in Table VI-21.

Table VI-21. Outdoor Airborne Radon Monitoring at the SLAPS

Monitoring Location	Monitoring Station	CY 2009 Radon Data	CY 2010 Radon Data	CY 2011 Radon Data	CY 2012 Radon Data	CY 2013 Radon Data
		(pCi/L)				
SLAPS	PA-1	0	0	0	0	0
	PA-2	---	0	0	0.05	0
	PA-3	---	0	0	0	0
	PA-4	0	0.3	0	0.05	0
	PA-5	0	---	---	---	---
	PA-6	0	---	---	---	---

Note:
--- Sampling not conducted.

Data Analysis

Outdoor airborne radon data from the SLAPS were used to calculate an average annual concentration and an annual EDE to a hypothetically maximally exposed individual. A summary of the outdoor radon concentrations above background and calculated dose rates is presented in Table VI-22.

Table VI-22. Outdoor Airborne Radon Concentrations and Dose Rates at the SLAPS

CY	Average Annual Concentration above Background	Annual Dose Rate[a]	10 *CFR* 20 Limit (100 mrem/yr)
	(pCi/L)	(mrem/yr)	
2009	0	0	100
2010	0.08	0	100
2011	0	0	100
2012	0.02	<0.1	100
2013	0	0	100

[a] Although the annual dose to a member of the public from outdoor airborne radon was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to outdoor airborne radon only.

As shown in Table VI-22, average annual concentrations and associated doses for prior and subsequent years remained consistent. For each CY, the annual dose for the outdoor airborne radon pathway was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20.1301 dose limit (see the "Total Effective Dose Equivalents" section for the SLAPS and SLAPS VPs and Table VI-23). However, as shown in Table VI-22, all annual doses for the outdoor airborne radon pathway are less than the 100 mrem/yr limit for CY 2009 to CY 2013.

Trend Analysis

For CY 2009 through CY 2013, all annual outdoor airborne radon concentrations and dose rates at the SLAPS were below the respective 10 *CFR* 20 values, with negligible variance from year to year.

Total Effective Dose Equivalents

The TEDE for each CY (i.e., CY 2009 through CY 2013) was calculated by summing the annual dose rates estimated for the external gamma pathway, airborne particulates pathway, and the outdoor airborne radon pathway. TEDEs were calculated to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Table VI-23 shows that the pathway-specific dose rates and TEDEs calculated for all CYs are less than the 10 *CFR* 20 dose limit.

The TEDEs do not include the indoor radon exposure pathway. However, indoor radon WLs were determined to be below the 40 *CFR* 192 limit of 0.02 WL for each building monitored.

Table VI-23. Annual Radiological Dose Rates and Total Effective Dose Equivalents Calculated for the SLAPS/SLAPS VPs

CY	Annual Dose Rates (mrem/yr)			TEDE (mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	External Gamma	Airborne Particulates	Outdoor Airborne Radon		
2009	<0.1	0	0	<0.1	100
2010	<0.1	<0.1	0	<0.1	100
2011	<0.1	<0.1	0	<0.1	100
2012	<0.1	<0.1	<0.1	<0.1	100
2013	<0.1	<0.1	0	<0.1	100

Site Radiological Monitoring

Program Overview (Latty Avenue Properties)

Site radiological monitoring consisted of collecting gamma radiation, airborne particulate radionuclide, and outdoor and indoor radon data. The data were used to evaluate the compliance status of each site with ARARs, to evaluate trends, and to assess the magnitude of radiological exposures to the general public, as appropriate. According to the respective EMDARs, radiological air monitoring was conducted at the Latty Avenue Properties as shown in the following list, by CY.

- CY 2009 – HISS, VP-40A (partial), Futura, and VP-02(L);
- CY 2010 – HISS, Futura, and VP-02(L);
- CY 2011 – HISS, VP-40A (partial), Futura, and VP-02(L);
- CY 2012 – Futura; and
- CY 2013 – Futura.

Applicable Standards

Title 40 CFR *192.12(b)*

Indoor airborne radon in affected buildings was compared to the regulatory criterion of 0.02 WLs listed in 40 *CFR* 192.12(b).

Title 40 CFR *61.102(a)*

Airborne particulate radionuclide data from the site were used to calculate the EDE to a critical receptor. The NESHAP standard of EDE to a critical receptor from radionuclide emissions is 10 mrem/yr, as stated in 40 *CFR* 61.102(a).

Evaluation Criteria

Title 10 CFR *20*

The regulatory dose limit for members of the public is 100 mrem/yr from all pathways, as stated in 10 *CFR* 20.1301. Title 10 *CFR* 20.1301 is not an ARAR in the NC ROD, but this standard was used as a BMP. Achievement of the dose limit in 10 *CFR* 20.1301 can be demonstrated in one of the two following ways, as described in §20.1302(b)(1) and (2).

1. Demonstrating by measurement or calculation that the TEDE to the individual likely to receive the highest dose from the HISS operations does not exceed the annual dose limit (100 mrem/yr).
2. Demonstrating that (*i*) the annual average concentration of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area does not exceed the values specified in Table 2 of Appendix B to Part 20 and (*ii*) if an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 2 mrem/hour.

Gamma radiation, airborne particulate radionuclide, and outdoor airborne radon data from the site were used to evaluate the cumulative dose to a hypothetically impacted individual (member of the public) from exposure to radiological contaminants at the HISS in order to demonstrate achievement of the 10 *CFR* 20.1301 dose limit.

Gamma Radiation Monitoring

Monitoring Overview

Gamma radiation was measured using TLDs. TLDs at the HISS were located at the site perimeter. At each monitoring station, the TLDs were placed approximately 3 ft (0.9 m) above the ground surface inside a housing shelter. The TLDs were collected quarterly and sent to an off-site vendor for analysis. Gamma radiation monitoring was performed at the HISS at five locations during CY 2009 through CY 2011. Environmental TLD monitoring was not conducted at Latty Avenue Properties other than the HISS during those years. Because cleanup activities at the HISS and Futura (the Latty Avenue Properties with the highest remaining levels of residual contamination) were completed in 2011, external gamma radiation exposures from Latty Avenue Properties were considered negligible. Therefore, environmental TLD monitoring was not conducted at Latty Avenue Properties in CY 2012 or CY 2013.

Monitoring Program Results

The gamma radiation data collected from each location during CY 2009 to CY 2011 were corrected for background, shelter absorption, and fade and were normalized to exactly one year to calculate an annual dose. The corrected annual gamma radiation results are presented in Table VI-24.

Table VI-24. External Gamma Radiation Monitoring at the HISS

Monitoring Location	Monitoring Station	CY 2009 TLD Data	CY 2010 TLD Data	CY 2011 TLD Data	CY 2012 TLD Data	CY 2013 TLD Data
		(mrem/yr)				
The HISS	HA-1	0	1	0	---	---
	HA-2	0	0	0	---	---
	HA-3	9	15	16	---	---
	HA-4	1	1	0	---	---
	HA-5	0	0	1	---	---

Note:

--- Sampling not conducted.

Data Analysis

Gamma radiation data from the HISS were used to calculate an average dose rate and an annual EDE to a hypothetically maximally exposed individual. The average dose rate was compared to the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. The 10 *CFR* 20.1302(b)(2)(ii) limit is not an ARAR in the NC ROD, but this standard was used as a BMP. A summary of the calculated gamma radiation dose rates is presented in Table VI-25.

The average dose rate during CY 2009 to CY 2011 was less than the 10 *CFR* 20.1302(b)(2)(ii) limit of 2 mrem/hour. The annual dose to a member of the public from gamma radiation was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr during CY 2009 to CY 2011 (see the "Total Effective Dose Equivalents" section for the Latty Avenue Properties and Table VI-32). However, as shown in Table VI-25, all annual dose rates for external gamma pathways are less than the 100 mrem/yr limit for CY 2009 to CY 2011.

Table VI-25. External Gamma Dose Rate at the HISS

CY	Maximum Average Dose Rate above Background[a]	10 *CFR* 20 Limit (2 mrem/hour)	Annual Dose Rate[b]	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/hour)		(mrem/yr)	
2009[c]	<0.1	2	<0.1	100
2010	<0.1	2	<0.1	100
2011	<0.1	2	<0.1	100
2012	---	2	---	100
2013	---	2	---	100

[a] Calculated by dividing the maximum annual gamma radiation result in Table VI-24 by 8,760 hours, the number of hours in a year, for each location.

[b] Although the annual dose to a member of the public from external gamma was added to dose rates from other pathways to demonstrate the 10 *CFR* 20 dose limit, doses listed in this column are due to external gamma only.

[c] The annual dose rate for CY 2009 represents the maximum annual dose rate estimated for two business receptors. According to the *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009* (NC EMDAR CY 2009) (USACE 2010k), one receptor is located approximately 164 ft (50 m) east of the HISS perimeter and 361 ft (110 m) from the center of the HISS. The other receptor is located approximately 164 ft (50 m) west of the HISS perimeter and 426.5 ft (130 m) from the center of the HISS.

Note:

--- Sampling not conducted.

Trend Analysis

The annual dose to a member of the public from gamma radiation at the Latty Avenue Properties was far below the 10 *CFR* 20 limit for all years, with negligible variance from year to year.

Airborne Particulate Monitoring

Monitoring Overview

Airborne radioactive particulates result from radioactive material in soil (or other sources) that becomes suspended in the air. Airborne radioactive particulates were measured by drawing air through a filter membrane with an air sampling pump placed approximately 3 ft (0.9 m) above the ground and then analyzing the material contained on the filter. The results of the analysis, when compared to the amount of air drawn through the filter, were reported as radioactive contaminant concentrations in µCi/mL.

Site perimeter air sampling for radiological particulates was conducted at the HISS during CY 2009 to CY 2011. For other Latty Avenue Properties, air sampling for radionuclide particulates was conducted at the perimeter of each active excavation and loadout area during CY 2011. Air particulate samples were also collected during indoor remediation activities at Futura and VP-01(L) buildings in CY 2013. Air particulate samples were generally collected weekly and analyzed at the SLS radioanalytical laboratory. No excavation or loadout activities for the Latty Avenue Properties occurred in CY 2012. Therefore, radioactive particulate emissions were considered negligible, and air sampling for particulate radionuclides was not required in CY 2012 or CY 2013.

Monitoring Program Results

The annual dose was calculated for a hypothetically maximally exposed individual. The average annual gross alpha and gross beta concentrations and the annual dose rate to a hypothetically maximally exposed individual are presented in Table VI-26.

Table VI-26. Air Particulate Monitoring at the Latty Avenue Properties

CY	Average Annual Gross Alpha Concentration[a] (µCi/mL)	Average Annual Gross Beta Concentration[a] (µCi/mL)	Annual Dose (mrem/yr)
2009[b]	3.1E-15	2.8E-14	3.6
2010	4.2E-15	2.5E-15	3.0
2011	2.2E-15	2.5E-15	<0.1
2012	---	---	---
2013	---	---	---

[a] Average annual concentrations are determined using data from all applicable Latty Avenue Properties.

[b] The annual dose rate for CY 2009 represents the maximum annual dose rate estimated for two business receptors. According to the NC EMDAR CY 2009 (USACE 2010k), one receptor is located approximately 164 ft (50 m) east of the HISS perimeter and 361 ft (110 m) from the center of the HISS. The other receptor is located approximately 164 ft (50 m) west of the HISS perimeter and 426.5 ft (130 m) from the center of the HISS. The higher dose rate was calculated for the east receptor.

Note:

--- Sampling not conducted.

Data Analysis

Airborne particulate data were used to calculate radionuclide emission rates to determine if the EDE to a member of the public exceeded the 40 *CFR* 61.102(a) standard of 10 mrem/yr. A comparison of the EDE due to airborne particulate radionuclides at the HISS and the regulatory limits is presented in Table VI-27.

Table VI-27. Airborne Particulate Dose Rate at the Latty Avenue Properties

CY	Annual Dose Rate[a]	40 *CFR* 61.102(a) Standard (10 mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	(mrem/yr)		
2009[b]	3.6	10	100
2010	3.0	10	100
2011	<0.1	10	100
2012	---	10	100
2013	---	10	100

[a] Although the annual dose to a member of the public from airborne particulates was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to airborne particulates only.

[b] The annual dose rate for CY 2009 represents the maximum annual dose rate estimated for two business receptors. According to the NC EMDAR CY 2009 (USACE 2010k), one receptor is located approximately 164 ft (50 m) east of the HISS perimeter and 361 ft (110 m) from the center of the HISS. The other receptor is located approximately 164 ft (50 m) west of the HISS perimeter and 426.5 ft (130 m) from the center of the HISS. The higher dose rate was calculated for the east receptor.

Note:

--- Sampling not conducted.

As shown in Table VI-27, the annual dose to a member of the public from air particulate radionuclides did not exceed the 40 *CFR* 61.102(a) standard of 10 mrem/yr during CY 2009 to CY 2011 or CY 2013. For these CYs, the estimated EDE was added to the radiological doses from other pathways to determine if the TEDE to a member of the public exceeded the 10 *CFR* 20 limit of 100 mrem/yr (see the "Total Effective Dose Equivalents" section for the Latty Avenue Properties and Table VI-32). However, as shown in Table VI-27, all EDEs for the air particulate pathway were less than the 100 mrem/yr limit for CY 2009 to CY 2011 and CY 2013.

Trend Analysis

The annual dose to a member of the public from airborne particulate radionuclides at the Latty Avenue Properties was below the 40 *CFR* 61.102(a) standard for all years and had a slight downward trend over the period. The average annual gross alpha and gross beta results had a slight upward trend over the period. This trend is likely due to remediation activities resuming at Latty Avenue Properties in CY 2011 and CY 2013.

Radon Monitoring

Monitoring Overview

Outdoor airborne radon monitoring was performed during CY 2009 to CY 2011 at the HISS using ATDs placed around the site perimeter to measure radon emissions. The detectors were collocated with the TLDs at the site. The ATDs were collected semi-annually. Because outdoor cleanup activities at the HISS and Futura were completed in CY 2011, outdoor exposures to radon from Latty Avenue Properties were considered negligible in CY 2012 and CY 2013. Therefore, outdoor radon monitoring was not conducted at Latty Avenue Properties in CY 2012 or CY 2013.

Outdoor airborne radon concentrations were used to calculate an EDE to a hypothetically maximally exposed individual and added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Outdoor airborne radon monitoring was performed at the HISS at five locations during CY 2009 through CY 2013. Outdoor airborne radon monitoring was not conducted at Latty Avenue Properties other than the HISS.

Indoor airborne radon monitoring was performed at Futura buildings adjacent to the HISS using ATDs placed at several locations in each of three Futura buildings at a height of 4 ft (1.2 m) (to approximate breathing zone conditions) during CY 2009 through CY 2013. The ATDs were

collected semi-annually. The indoor airborne radon results (including background) in each building were evaluated based on the 0.02 WL criteria contained in 40 *CFR* 192.12(b).

Outdoor Radon Alpha Track Detectors

Monitoring Program Results

The outdoor airborne radon data collected from each location during CY 2009 through CY 2011 were corrected for background and were normalized to exactly one year to calculate an annual dose. The calculated annual outdoor radon monitoring results are presented in Table VI-28.

Table VI-28. Outdoor Airborne Radon Monitoring at the HISS

Monitoring Location	Monitoring[a] Station	CY 2009 ATD Data	CY 2010 ATD Data	CY 2011 ATD Data	CY 2012 ATD Data	CY 2013 ATD Data
		(pCi/L)				
The HISS	HA-1	0.0	0.1	0.0	---	---
	HA-2	0.0	0.0	0.0	---	---
	HA-3	0.0	0.0	0.0	---	---
	HA-4	0.0	0.1	0.0	---	---
	HA-5	0.0	0.1	0.0	---	---

[a] Station names and locations may have varied slightly from year to year. The exact location of each station can be found in the annual EMDAR for the respective year.

Note:

--- Sampling not conducted.

Data Analysis

Outdoor airborne radon data from the HISS were used to calculate an average annual concentration and an annual EDE to a hypothetically maximally exposed individual. The annual dose for the outdoor airborne radon pathway was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20.1301 dose limit. A summary of the outdoor airborne radon concentrations above background and calculated dose rates is presented in Table VI-29.

Table VI-29. Outdoor Airborne Radon Concentrations and Dose Rates at the HISS

CY	Average Annual Concentration above Background	Annual Dose Rate[a]	10 *CFR* 20 Limit (100 mrem/yr)
	(pCi/L)	(mrem/yr)	
2009[b]	0.0	0.0	100
2010	<0.1	0.1	100
2011	0.0	0.0	100
2012	---	---	100
2013	---	---	100

[a] Although the annual dose to a member of the public from outdoor airborne radon was added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20 dose limit, doses listed in this column are due to outdoor airborne radon only.

[b] The annual dose rate for CY 2009 represents the maximum annual dose rate estimated for two business receptors. According to the NC EMDAR CY 2009 (USACE 2010k), one receptor is located approximately 164 ft (50 m) east of the HISS perimeter and 361 ft (110 m) from the center of the HISS. The other receptor is located approximately 164 ft (50 m) west of the HISS perimeter and 426.5 ft (130 m) from the center of the HISS. The higher dose rate was calculated for the east receptor.

Note:

--- Sampling not conducted.

As shown in Table VI-29, the annual doses for the outdoor airborne radon pathway were added to dose rates from other pathways to demonstrate achievement of the 10 *CFR* 20.1301 dose limit (see the "Total Effective Dose Equivalents" section for the Latty Avenue Properties and

Table VI-32). However, as shown in Table VI-29, all annual doses for the outdoor airborne radon pathway are less than the 100 mrem/yr limit for CY 2009 to CY 2011.

Trend Analysis

The annual airborne radon concentrations measured at the HISS exhibited negligible variance from year to year. The annual doses are well below the 100 mrem/yr limit and exhibit no significant variance from CY 2009 to CY 2011.

Indoor Radon Alpha Track Detectors

Monitoring Program Results

The indoor airborne radon data collected from each location at Futura during CY 2009 through CY 2013 were corrected for background and were normalized to exactly one year to calculate an annual dose. The calculated annual indoor airborne radon monitoring results are presented in Table VI-30.

Table VI-30. Indoor Airborne Radon Monitoring at Futura

Monitoring Location	Monitoring Station	CY 2009 ATD Data[a]	CY 2010 ATD Data[a]	CY 2011 ATD Data[a]	CY 2012 ATD Data[a]	CY 2013 ATD Data[a]
		(pCi/L)				
North Building	HF-1	2.60	2.65	1.55	1.90	1.45
	HF-2	5.55	2.4	3.4	4.05	4.45
	HF-3	0.75	0.5	0.5	0.55	0.50
Middle Building	HF-4	0.70	0.5	0.2	0.60	0.60
	HF-5	1.00	0.7	0.6	0.95	0.50
	HF-6	0.80	0.55	0.3	0.70	0.50
	HF-7	1.10	0.95	0.85	1.25	0.90
South Building	HF-8	0.50	0.3	0.25	0.45	0.80
	HF-9	0.75	0.45	0.25	0.50	0.80
	HF-10	0.95	0.4	0.25	0.65	0.80

[a] Results reported from vendor for two periods are averaged to estimate an annual average radon concentration (pCi/L).

Data Analysis

Indoor airborne radon data from the HISS were used to calculate an average annual concentration in each affected building. Another calculation was performed to convert the average concentration to a WL value for comparison to the ARAR WL value of 0.02, as listed in 40 *CFR* 192.12(b). A summary of the indoor airborne radon concentrations and calculated WLs is presented in Table VI-31.

Table VI-31. Indoor Airborne Radon Concentrations and Working Levels at Futura

Monitoring Period	Average ATD Data[a]			Average WLs[b]			
	North Building	Middle Building	South Building	North Building	Middle Building	South Building	40 *CFR* 192.12(b) Limit
	(pCi/L)			(WL)			
CY 2009	2.97	0.90	0.73	0.012	0.004	0.003	0.02
CY 2010	1.85	0.68	0.38	0.007	0.003	0.002	0.02
CY 2011	1.82	0.49	0.25	0.007	0.002	0.001	0.02
CY 2012	2.17	0.88	0.53	0.009	0.004	0.002	0.02
CY 2013	2.13	0.63	0.80	0.009	0.003	0.003	0.02

[a] Average ATD data were determined by averaging monitoring station concentrations (pCi/L) presented in Table VI-30 for each building.

[b] The average annual WL is calculated by dividing the average pCi/L by 100 pCi/L per WL and multiplying by 0.4. The average annual WL must be less than 0.02 (40 *CFR* 192.12(b)).

As shown in Table VI-31, the average annual WLs calculated for each monitored Futura building during CY 2009 to CY 2013 were less than the 40 *CFR* 192.12(b) value of 0.02 WL.

Trend Analysis

The annual indoor airborne radon WLs calculated for all of the investigated Futura buildings were below the 40 *CFR* 192 limit, with negligible variance from year to year. There is no apparent trend over the period.

Total Effective Dose Equivalents

The TEDE for each CY (i.e., CY 2009 through CY 2013) was calculated by summing the annual dose rates estimated for the external gamma pathway, airborne particulates pathway, and the outdoor airborne radon pathway. TEDEs were calculated to demonstrate achievement of the 10 *CFR* 20 dose limit of 100 mrem/yr. Table VI-32 shows that the pathway-specific dose rates and TEDEs calculated for all CYs are less than the 10 *CFR* 20 dose limit.

Table VI-32. Annual Radiological Dose Rates and Total Effective Dose Equivalents Calculated for the Latty Avenue Properties

CY	Annual Dose Rates (mrem/yr)			TEDE (mrem/yr)	10 *CFR* 20 Limit (100 mrem/yr)
	External Gamma	Airborne Particulates	Outdoor Airborne Radon		
2009[a]	<0.1	3.6	0.0	3.6	100
2010	<0.1	3.0	0.1	3.1	100
2011	<0.1	<0.1	0.0	<0.1	100
2012	---	---	---	---	100
2013	---	---	---	---	100

[a] The annual dose rate for CY 2009 represents the maximum annual dose rate estimated for two business receptors. According to the NC EMDAR CY 2009 (USACE 2010k), one receptor is located approximately 164 ft (50 m) east of the HISS perimeter and 361 ft (110 m) from the center of the HISS. The other receptor is located approximately 164 ft (50 m) west of the HISS perimeter and 426.5 ft (130 m) from the center of the HISS. The higher dose rates were calculated for the east receptor.

Note:

--- No sampling conducted; no TEDE calculation was necessary.

The TEDEs do not include the indoor airborne radon exposure pathway; however, indoor airborne radon WLs were determined to be below the 40 *CFR* 192 limit of 0.02 WL for each building monitored.

Soil Sampling Program

FSS verification and PDI sampling has been conducted at properties at which removal actions and/or remedial actions have taken place. The purpose of the PDI sampling is to more accurately delineate the nature and extent of soil contamination prior to initiation of remedial action activities (e.g., soil excavation). The purpose of the verification sampling is to demonstrate that the removal action or remedial action has been completed and the residual contamination is below the removal goal or RG. The USACE evaluates the results to ensure the residual concentrations in the excavation meet the SLDS ROD remediation criteria for the SLDS, and the NC ROD RGs for the North St. Louis County Sites. Table VI-33 summarizes SLS completed actions during this five-year review period.

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
SLDS	Mallinckrodt Plant 9 and Security Gate 49	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Northeast Corner of Plant 9 and Security Gate Number 49 Area, St. Louis, Missouri* (USACE 2010i).	Residual radioactivity in the accessible areas on both properties meet the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	3	6E-05	NA
SLDS	DT-3 Norfolk Southern Railroad VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Norfolk Southern Railroad (DT-3), St. Louis, Missouri* (USACE 2013n).	Residual radioactivity in the accessible soil on DT-3 meet the requirements of the SLDS ROD. The accessible soil on DT-3 meets the criteria for unrestricted use.	5	1E-04	NA
SLDS	DT-4 Gunther Salt VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Gunther Salt (DT-4), St. Louis, Missouri* (USACE 2012d).	Residual radioactivity in the accessible areas on DT-4 meet the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	4	8E-05	NA
SLDS	DT-5, DT-13, DT-14, DT-16, DT-18 and the Second Street Corridor	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor, St. Louis, Missouri* (USACE 2010b).	No remedial action required. Accessible soil on DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor meets the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	1	2E-05	NA
SLDS	DT-8 PSC Metals VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property PSC Metals, Inc. (DT-8), St. Louis, Missouri* (USACE 2013l).	Residual radioactivity in the accessible soil and consolidated material surfaces on DT-8 meets the requirements of the SLDS ROD. The accessible soil on DT-8 meets the criteria for unrestricted use.	2	4E-05	NA
SLDS	TRRA Soil Spoils Area VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Terminal Railroad Association Soil Spoils Area, St. Louis, Missouri* (USACE 2013m).	Residual radioactivity in the accessible soil on the TRRA Soil Spoils Area met the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	1	3E-05	NA

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
SLDS	DT-10 Thomas & Proetz Lumber Company VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Thomas and Proetz Lumber Company (DT-10), St. Louis, Missouri* (USACE 2010h).	Residual radioactivity in the accessible soil on DT-10 meet the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	6	1E-04	All Tier 1 hazard ratios (HRs) less than 1.
SLDS	DT-15 Metropolitan St. Louis Sewer District Lift Station VP	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Property Metropolitan St. Louis Sewer District Lift Station (DT-15), St. Louis, Missouri* (USACE 2012b).	Accessible soil on DT-15 meets the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	0	0	NA
SLDS	DT-17 Christiana Court, LLC VP	*Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Christiana Court, LLC (DT-17), St. Louis, Missouri, Revision 0* (USACE 2012l).	Residual radioactivity in the accessible soil on DT-17 met the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	2	3E-05	NA
SLDS	DT-34 Hjersted VP	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Property DT-34, St. Louis, Missouri* (USACE 2012e).	No remedial action required. Accessible soil on DT-34 met the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	0.043	8E-07	NA
SLDS	DT-35 and DT-36	*Pre-Design Investigation and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-35 and DT-36, St. Louis, Missouri* (USACE 2009a).	No remedial action required. Accessible soil on DT-35 and DT-36 met the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	3	7E-05	NA
SLDS	DT-37 Lange-Stegmann VP	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Lange-Stegmann (DT-37), St. Louis, Missouri* (USACE 2013a).	No remedial action required. Accessible soil on DT-37 met the requirements of the SLDS ROD. The accessible soil meets the criteria for unrestricted use.	0.2	3E-06	NA

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
North St. Louis County Sites	VP-03 and VP-04	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 03 and 04, St. Louis, Missouri* (USACE 2011b).	No remedial action required. The soils on VP-03 and VP-04 meet the criteria for UUUE in accordance with the NC ROD.	2	2E-05	NA
North St. Louis County Sites	VP-05 and VP-06	*Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 05 and 06, St. Louis, Missouri* (USACE 2011g).	The soils and structures/consolidated materials on VP-05 and VP-06 meet the criteria for UUUE in accordance with the NC ROD.	2	2E-05	NA
North St. Louis County Sites	VP-08 and VP-09	*Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 08 and 09, St. Louis, Missouri* (USACE 2011j).	The soils and structures/consolidated materials on VP-08 and VP-09 meet the criteria for UUUE in accordance with the NC ROD.	1	1E-05	NA
North St. Louis County Sites	VP-09(C), VP-10(C), and the Road ROW	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Vicinity Properties 09(C), 10(C) and the Road Right-of-Way (Partial), St. Louis, Missouri* (USACE 2013f).	No remedial action required. Soils and structures on VPs 09(C), 10(C), and the Road ROW meet the criteria for UUUE in accordance with the NC ROD.	1	1E-05	NA
North St. Louis County Sites	VPs 10, 11, and 12	*Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 10, 11, and 12, St. Louis, Missouri* (USACE 2013h).	The soils and structures/consolidated materials on VPs 10, 11, and 12 meet the criteria for UUUE in accordance with the NC ROD.	1	1E-05	NA
North St. Louis County Sites	VPs 17, 18, 19, 20, 20A, and 25	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 17, 18, 19, 20, 20A, and 25, St. Louis, Missouri* (USACE 2009d).	No remedial action required. The residual soils on the Southwest Frost Avenue VPs meet the criteria for UUUE in accordance with the NC ROD.	2	2E-05	NA
North St. Louis County Sites	VP-31A	*Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 31A, St. Louis, Missouri* (USACE 2013i).	The soils and structures on VP-31A meet the criteria for UUUE in accordance with the NC ROD.	3	2E-05	NA

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
North St. Louis County Sites	Hazelwood Avenue, the ROW Adjacent to Hazelwood Avenue, and SLAPS VPs 32, 35, 35A, 36, 39, 40, 42, and 47	*Post-Remedial Action Report and Final Status Survey Evaluation for Hazelwood Avenue, the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 32, 35, 35A, 36, 39, 40, 42 and 47, St. Louis, Missouri* (USACE 2010g).	The soils and structures/consolidated materials on these properties meet the criteria for UUUE in accordance with the NC ROD.	2	3E-05	NA
North St. Louis County Sites	VPs 33, 34, and 37	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 33, 34, and 37, St. Louis, Missouri* (USACE 2010f).	No remedial action required. The soils and structures on VPs 33, 34, and 37 meet the criteria for UUUE in accordance with the NC ROD.	2	3E-05	NA
North St. Louis County Sites	VPs 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51, and 52	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51 and 52, St. Louis, Missouri* (USACE 2009e).	No remedial action required. Soils and structures on the Northeast Hazelwood Avenue VPs meet the criteria for UUUE in accordance with the NC ROD.	2	2E-05	NA
North St. Louis County Sites	VP-53	*Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 53, St. Louis, Missouri* (USACE 2011f).	The soils and structures/consolidated materials on VP-53 meet the criteria for UUUE in accordance with the NC ROD.	5	4E-05	NA
North St. Louis County Sites	VP-54	*Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 54, St. Louis, Missouri* (USACE 2011d).	The soils and structures/consolidated materials on VP-54 meet the criteria for UUUE in accordance with the NC ROD.	1	2E-05	NA
North St. Louis County Sites	VP-55	*Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 55, St. Louis, Missouri* (USACE 2011e).	The soils and structures/consolidated materials on VP-55 meet the criteria for UUUE in accordance with the NC ROD.	1	1E-05	NA
North St. Louis County Sites	VPs 60, 61, and 62 and Parcels 09K130104A and 09K130104B	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 60, 61, and 62 and Parcels 09K130104A and 09K130104B, Revision 0* (USACE 2013g).	No remedial action required. The soils on VPs 60, 61, and 62, and Parcels 09K130104a and 09K130104b meet the criteria for UUUE in accordance with the NC ROD.	3	2E-05	NA

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
North St. Louis County Sites	VP-63	*Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 63, St. Louis, Missouri* (USACE 2011c).	No remedial action required. The soils and structures/consolidated materials on the property meet the criteria for UUUE in accordance with the NC ROD.	0.9	2E-05	NA
North St. Louis County Sites	VP-40A (Partial)	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (Partial), St. Louis, Missouri* (USACE 2013e).	No remedial action required. Soils on VP-40A meet the criteria for UUUE in accordance with the NC ROD.	1	2E-05	NA
North St. Louis County Sites	IA-13: STLAA	*Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority, St. Louis, Missouri* (USACE 2013o).	The soils and structures/consolidated materials on IA-13 meet the criteria for UUUE in accordance with the NC ROD.	1	2E-05	All Tier 1 HRs less than 1.0.
North St. Louis County Sites	The HISS	*Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site, St. Louis, Missouri* (USACE 2013c).	The soils and structures/consolidated materials on the property meet the criteria for UUUE in accordance with the NC ROD.	1	2E-05	All Tier 1 HRs less than 1.0.
North St. Louis County Sites	VP-01(L) and Parcel 10K530087	*Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087, St. Louis, Missouri* (USACE 2010e).	The soils and structures/consolidated materials on VP-01(L) and Parcel 10K530087 meet the criteria for UUUE in accordance with the NC ROD.	0.3	6E-06	All Tier 1 HRs less than 1.0.
North St. Louis County Sites	VP-02(L)	*Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L), St. Louis, Missouri* (USACE 2012h).	The soils and structures/consolidated materials at VP-02(L) meet the criteria for UUUE in accordance with the NC ROD.	3	9E-06	All Tier 2 target organ HIs less than 1.
North St. Louis County Sites	VPs 03(L), 04(L), 05(L), and 06(L)	*Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 03(L), 04(L), 05(L), and 06(L), St. Louis, Missouri* (USACE 2012i).	The soils and structures/consolidated materials on these properties meet the criteria for UUUE in accordance with the NC ROD.	1	1E-06	NA

Table VI-33. SLS Final Status Survey Verification Soil Sampling Program Completed Actions (January 2009 – December 2013)

Site	Location	Document	Completed Action	Radiological COCs		Metal COCs
				Maximum Residual Dose[a] (mrem/yr)	Maximum Residual Risk[a] (unitless)	Two-Tiered Toxicity Assessment[b,c]
North St. Louis County Sites	Futura Property	*Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Property Futura, St. Louis, Missouri* (USACE 2014c).	The accessible soils and structures/consolidated materials on the property meet the criteria for UUUE in accordance with the NC ROD.	5	3E-05	All Tier 2 target organ HIs less than 1.
			Inaccessible soil on the property require land use controls to achieve the objectives of the NC ROD.	450[d]	8E-03[d]	NA
North St. Louis County Sites	SLAPS VPs 01, 02, 07, 13, 14, 15, and IA-11	*Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 01, 02, 07, 13, 14, 15, and Investigation Area 11 (Partial), Revision 0* (USACE 2014d).	The soils on these properties meet the criteria for UUUE in accordance with the NC ROD. The structures (i.e., buildings) associated with these properties were determined to be non-impacted.	2	2E-05	For IA-11, all Tier 1 HRs less than 1.0.

[a] Maximum residual doses and risks were determined using the RESidual RADioactivity (RESRAD) (computer model) and represent the maximum total doses and risks above background, summed over all radiological COCs, estimated to occur over a 1,000-year period at the property for the evaluated receptor scenario. COC-specific EPCs were calculated across all accessible soil areas at each property as the lesser of the UCL_{95} or the maximum detected concentration above background for residual soil (including accessible soil not requiring remediation). Modeled receptor scenarios at the SLS include the current and future industrial worker, utility worker, construction worker, maintenance worker, recreational user/trespasser (ages 6 to 14 years old), and the on-site resident, as applicable.

[b] A two-tiered toxicity assessment is performed as part of the PRAR or pre-design investigation report (PDIR) to calculate non-cancer HRs and/or target organ HIs for metal COCs based primarily on EPC comparisons with the soil RGs. A Tier 1 toxicity assessment result stating "All HRs less than 1.0" indicates that the ratio of the EPC to the RG is less than 1.0 for all metal COCs, and that ROD requirements are met. During the toxicity assessment, if at least one HR exceeds 1.0, then target organ HIs are calculated for the metal COCs as part of the Tier 2 toxicity assessment. If the HIs calculated for all COCs are less than the USEPA's acceptable limit of 1, then "All HIs less than 1" is indicated and the ROD requirements are met.

[c] The two-tiered toxicity assessment for metals COCs does not consider cancer risks, as well as USEPA's exposure factor, toxicity factor, and risk assessment method updates that have been published since the SLDS ROD and NC ROD. Therefore, in order to demonstrate the continued health protectiveness of the remedy, risk assessment calculations using equations and methodologies presented in the *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)* (RAGS Part A) (USEPA 1989), *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Assessment)* (RAGS Part E) (USEPA 2004), and *Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)* (RAGS Part F) (USEPA 2009a), along with other current guidances and exposure and toxicity factor updates, were performed as part of Section VII of this five-year review report. The calculations supporting the Section VII evaluations are presented in Appendix F of this five-year review report. The results of the calculations are summarized in Section VII for all SLDS and North St. Louis County Sites properties and sites for which metals were analyzed and evaluated.

[d] The dose and risk values presented for inaccessible soil at the Futura property represent the highest residual radiological dose and risk, estimated over a 1,000-year period, without ground cover in place, and exceed the benchmark dose of 19 mrem/yr and target risk range of 1E-06 to 1E-04. The highest residual radiological dose and risk calculated for inaccessible soil with ground cover in place (i.e., under current configurations) is 14 mrem/yr and 2E-04, respectively. Although the USEPA defines the CERCLA target risk range as 1E-06 to 1E-04, USEPA's OSWER Directive 9200.4-18 (*Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* [USEPA 1997a]) states "A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions." In accordance with OSWER 9200.4-18 (USEPA 1997a), if a dose assessment is conducted at a site, a risk level of 3E-04 "…is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by [the US]EPA in other radiation control programs." Therefore, under current configurations (i.e., with ground cover in place), inaccessible soil at the Futura property is protective of human health as long as the cover is maintained.

Note:
NA - Soil samples were not analyzed for metals.

Surface-Water and Sediment Monitoring Program

Monitoring Overview

The environmental monitoring plan for CWC evaluates the physical, radiological, and chemical parameters present in CWC's surface water and sediment. The radiological and chemical parameters to be monitored were based on the Environmental Monitoring Plan for the SLS and are not necessarily FUSRAP COCs. The monitoring programs are conducted at CWC as a part of the SLS to meet several objectives. These objectives are:

- assess the quality of surface water and sediment in CWC;
- compare the sampling results of the COCs to the RGs for sediment in the NC ROD; and
- evaluate/determine whether runoff from the SLAPS, the HISS and their VPs due to remedial actions is affecting the quality of surface water and sediment in CWC.

Sampling of CWC's surface water and sediment is conducted semi-annually at six monitoring stations (C002 through C007).

Monitoring Program Results

The evaluation results for the surface water and sediment sampling data for CWC from CY 2009 through CY 2013 are presented in the following section. The sampling locations along CWC are shown on maps included in the annual EMDARs. Monitoring parameters included field measurements (temperature, pH, specific conductance, ORP, and dissolved oxygen), radiological analytes (U-234, U-235, U-238, Th-228, Th-230, Th-232, Ra-226, and Ra-228) and non-radiological analytes (antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, and vanadium).

Surface water and sediment data collected from CWC are evaluated relative to historical sample results obtained at each station. In addition, prior to approval of the NC ROD in September 2005, data collected from CWC surface water and sediment were compared to the North St. Louis County Sites background concentrations. The Water Quality Criteria (WQC) in 10 *CSR* 20-7.031, Table A, Classifications I, II and V, were used if no background value existed for a given constituent. The background values and WQC are referred to as the pre-ROD evaluation criteria.

For CY 2009 through CY 2013, the surface-water and sediment data were evaluated using the criteria specified in the NC ROD (USACE 2005a). The NC ROD states that the Drinking Water Standard of 30 µg/L for total U may be used as a monitoring guide for surface water. The NC ROD also established data RGs for Ra-226, Th-230, and U-238 in sediment. These RGs are used in evaluating CWC sediment for CY 2009 through CY 2013. A trend analysis is also performed at each station to determine the effects of the remedial action on surface water and sediment in CWC.

Calendar Year 2009 CWC Sampling

Two sampling events were conducted for both surface water and sediment at all six monitoring stations during CY 2009. Surface-water results for U-234, U-235 and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L guideline for total U described in the NC ROD. The total U concentrations in surface water were less than the 30 µg/L guideline.

All sediment monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2009* was conducted as planned during CY 2009 (USACE 2008e). The sediment data collected in CY 2009 were

compared to the RGs as described in the NC ROD (USACE 2005a). The evaluation of the monitoring data demonstrates that all applicable ARARs have been met.

Calendar Year 2010 CWC Sampling

Two sampling events were conducted for both surface water and sediment at all six monitoring stations during CY 2010. Surface-water results for U-234, U-235, and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L guideline for total U described in the NC ROD. The total U concentrations in surface water were less than the 30 µg/L guideline.

All sediment monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2010* was conducted as planned during CY 2010 (USACE 2010l). The sediment data collected in CY 2010 were compared to the RGs as described in the NC ROD (USACE 2005a). The evaluation of the monitoring data demonstrates that all applicable ARARs have been met.

Calendar Year 2011 CWC Sampling

Two sampling events were conducted for both surface water and sediment at all six monitoring stations during CY 2011. Surface-water results for U-234, U-235, and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L guideline for total U described in the NC ROD. The total U concentrations in surface water were less than the 30 µg/L guideline.

All sediment monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2011* was conducted as planned during CY 2011 (USACE 2011n). The sediment data collected in CY 2011 were compared to the RGs as described in the NC ROD (USACE 2005a). The evaluation of the monitoring data demonstrates that all applicable ARARs have been met.

Calendar Year 2012 CWC Sampling

Two sampling events were conducted for both surface water and sediment at all six monitoring stations during CY 2012. Surface-water results for U-234, U-235, and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L guideline for total U described in the NC ROD. The total U concentrations in surface water were less than the 30 µg/L guideline.

All sediment monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2012* was conducted as planned during CY 2012 (USACE 2011o). The sediment data collected in CY 2012 were compared to the RGs as described in the NC ROD (USACE 2005a). The evaluation of the monitoring data demonstrates that all applicable ARARs have been met.

Calendar Year 2013 CWC Sampling

Two sampling events were conducted for both surface water and sediment at all six monitoring stations during CY 2013. Surface-water results for U-234, U-235, and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L guideline for total U described in the NC ROD. The total U concentrations in surface water were less than the 30 µg/L guideline.

All sediment monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2013* was conducted as planned during CY 2013 (USACE 2012o). The sediment data collected in CY 2013 were compared to the RGs as described in the NC ROD (USACE 2005a). The evaluation of the monitoring data demonstrates that all applicable ARARs have been met.

Trend Analysis

Figure VI-7 represents the concentration trend analysis for different radionuclides in surface water and sediment. The concentrations of Ra-226, Th-230, Th-232, and total U at each monitoring station were graphed for the CY 2009 through CY 2013 period. The COC concentrations in surface water are scaled by the primary *y*-axis to the left of the plot area. Concentrations in sediment are scaled by the secondary *y*-axis to the right of the plot area.

With the exception of the Ra-226 concentration observed for the first (March) sampling event in 2009 at C006, Figure VI-7 shows that Ra-226, Th-230, and Th-232 concentrations in surface water have been relatively stable, flat, and generally varying within a small range (±2 pCi/L) at all six stations over the CY 2009 through CY 2013 period. Total U concentrations in surface water were also relatively stable, flat, and generally varied within a small range (±2 µg/L) at all six stations. A few exceptions to the stable (flat) trend are the increase in total U concentrations observed for the first (March) sampling events in CY 2010 and 2011 at C003, the first (March) sampling event in CY 2010 at C004, and the second (October) sampling event in CY 2013 at C007. However, the increased total U concentrations were brief and well below the NC ROD monitoring guideline. The concentrations of total U in surface-water samples from CWC have not exceeded the NC ROD monitoring guideline (30 µg/L) during the CY 2009 through CY 2013 period.

Based on the graphs on Figure VI-7, the Ra-226 concentrations in sediment have been relatively stable over the CY 2009 through CY 2013 period. An exception to the stable (flat) trend is the increase in Ra-226 concentration observed for the second (October) sampling event in CY 2010 at C005. However, the increased Ra-226 concentration was slight, brief, and well below the NC ROD Monitoring guideline. The concentrations in sediment samples from CWC have not exceeded the RG (15 pCi/g) during the CY 2009 through CY 2013 period.

A temporary increase in the Th-230 concentration in sediment occurred at C005 during the second (October) sampling event in CY 2010 and at C006 during the first (March) sampling event in CY 2011. However, these values did not exceed the RG. It should be noted that the scale of the *y*-axis on the Th-230 graph for Station C005 and Station C006 differs from the scale of the *y*-axis on the other Th-230 graphs on Figure VI-7. These axes have been increased in scale in order to show the higher Th-230 values for October 2010 at C005 and March 2011 at C006. In general, the Th-230 concentrations in sediment are slightly higher at station C005 with respect to other stations during the CY 2009 through CY 2013 period. The concentrations of Th-230 in sediment samples from CWC have not exceeded the RG (43 pCi/g) during the CY 2009 through CY 2013 period.

Total U concentrations in sediment are relatively stable (flat) and consistent at all six stations over the CY 2009 through CY 2013 period. The concentrations of total U in sediment samples from CWC have not exceeded the NC ROD monitoring guideline (30 µg/L) during the CY 2009 through CY 2013 period.

In addition to the trend analysis, the concentration trends in surface water and sediment were compared to determine if there is a correlation between the concentrations of Ra-226, Th-230, Th-232, and total U in surface water and the concentrations of the same COCs in the sediments at each sampling location. When two parameters (such as a COC's concentration in surface water and its concentration in sediment at a particular location) vary together, a correlation is said to exist between the two parameters. Based on the graphs on Figure VI-7, the localized and temporary changes in the concentrations of each COC over time in surface-water samples differ from the localized and temporary changes in their concentrations in the sediment samples. However, the Ra-226, Th-230, Th-232, and total U concentrations in surface-water and sediment samples over the CY 2009 to CY 2013 period are generally stable (flat) and consistent at all the

monitoring stations, with a few minor exceptions as discussed previously. Based on Figure VI-7, there is not a significant correlation between surface-water and sediment concentrations of Ra-226, Th-230, Th-232, and total U at any of the monitoring stations.

In summary, during the period of this review (January 2009 through December 2013), no exceedances of the total U monitoring guideline for surface water in CWC or of the NC ROD RGs for sediment occurred. The evaluation of the surface-water and sediment data indicates that the quality of the surface water and sediment in CWC has not been impacted by runoff resulting from the remedial actions at the North St. Louis County Sites.

Site Inspections

The purpose of the site inspections is to gather information about the SLS status and visually confirm and document the impact of the response actions on the site and the surrounding areas. Because of the size of the SLS and the distance between them, separate inspections were conducted for the SLDS and the North St. Louis County Sites (the HISS, the SLAPS, and SLAPS VPs).

Site inspections were conducted by representatives of the USEPA, the MDNR, and the USACE on November 8 (SLDS) and November 9, 2012 (North St. Louis County Sites). A Site Inspection Checklist was completed for each inspection. The checklist focuses on the implementation of the remedy, adequacy of O&M, early indicators of potential remedy problems, and opportunities for optimization.

No significant issues were identified as part of the site inspections. Results of the site inspections indicate that the sites are well maintained. Site access appeared to be sufficiently restricted where necessary. Fences, gates, and signage were in good condition, and roads and parking lots were in good repair. No vandalism was observed. No equipment was observed to be in disrepair during the inspections.

Two opportunities for optimization were identified during the site inspections. One of the opportunities identified for the SLDS involves conducting an inspection of the water treatment system at Plant 7S prior to reinitiating operations there. The inspection would ensure it functions properly and determine if leaks had developed in any of the system components during its period of inactivity. One additional opportunity for optimization was identified at both the SLDS and North St. Louis County Sites. It was recommended that property owners and utility companies be reminded annually of the need to contact the USACE prior to conducting intrusive work in order to provide more frequent updates to the contact information.

A more detailed summary of the results of the inspections is provided in Appendix D.

Interviews

In 2015, St. Louis Sites community interviews were conducted as a part of the FUSRAP five-year review. Respondents included property owners; business owners; representatives of city, county, and federal elected officials; utility company representatives; citizen interest groups (e.g., St. Louis Oversight Committee); residents not otherwise affiliated with interest groups; and state and local government agency representatives.

Eleven interviewees used the word “responsive” to describe their interactions with USACE. They described the USACE and their contractors as being “well-informed,” “helpful,” “prompt,” and “easy to work with.” The consensus of interviewees agreed that the USACE takes the time needed to hear and respond to community concerns and questions. When asked about the cleanup progress of the past and ongoing activities at the sites, nearly all individuals described the work quality as

very good to excellent. With the exceptions of specific concerns discussed in the following paragraphs, the community members interviewed expressed that they were well informed on the progress made and knew what was done and why in historical and ongoing site cleanup. Most individuals agreed that the current community involvement approach is appropriate and adequately tailored to their needs and expectations. Approximately half of the participants described themselves as extensively concerned and involved in the sites, but they said the majority of the community was unaware or unconcerned about the cleanup. The representative from the MDNR said the regulators "appreciate USACE's continued efforts to keep us informed." A brief summary of the concerns raised by the community during the interviews follows.

Concerns Expressed During the Community Interviews

Slow Progress

Nine interviewees expressed concerns over the length of time the USACE has worked on the local sites. Five individuals felt the progress was slowed because of a deficit of workers allotted to the sites and/or a lack of adequate funding to do the work.

Health Effects

Several of those interviewed wanted to know more about health risks a FUSRAP Site might pose. Six residents expressed concerns about the health effects of pollution at specific sites in the area. The predominant concern was CWC, although interviewees also mentioned Destrehan Street, the Ballfields area, and the Latty Avenue VPs. Two residents mentioned their concerns about the Westlake site and its associated health effects. One understood that Westlake is not a FUSRAP Site under the USACE, but she urges congressional action to include the site. One interviewee expressed concern about the local cancer rate and wondered if that may be linked to contamination from the FUSRAP Sites.

Specific Contaminants

Several individuals expressed concern about a specific site chemical and the potential health risks. When asked if they were aware of community concerns regarding the site, three people named Th-230 as a concern. One said the RGs set by the ROD are "permissive" and should be changed.

Land Use Issues

The regulator interviewed said she is "aware of community concerns about possible fencing and signage along Coldwater Creek to minimize public intrusion on these areas until they are fully characterized." Three residents said they believe signage is necessary.

Continued Community Outreach

Several residents commented that they are interested in continuing to participate in outreach activities and in receiving outreach materials from the USACE. Six people commended the newsletter and felt the document met their information needs. Four residents praised the public meetings (particularly those hosted by the St. Louis Oversight Committee) and USACE participation in them. Three business owners praised the communications they received from the USACE. One business owner said that if he were to have a question or concern, he could pick up the phone for an answer. Two people praised the website for including information, and one individual did not feel "well informed" by the information on the website. One person requested email updates from the USACE between newsletter distributions and meetings.

The interview record forms are provided in Appendix E.

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VII. TECHNICAL ASSESSMENT

ST. LOUIS DOWNTOWN SITE

Question A: Is the response action functioning as intended by the decision documents?

Answer A: Yes, the response action is functioning as intended by the decision documents.

The SLDS ROD (USACE 1998a) states:

> The main components of the selected remedial action include:
>
> - Excavation and off-site disposal of approximately 65,000 cubic meters (85,000 cubic yards) (in-situ) contaminated soil, and
> - No remedial action is required for ground water beneath the site. Perimeter monitoring of the ground water in the Mississippi River alluvial aquifer, designated as the hydrostratigraphic B Unit, will be performed and the need for ground water remediation will be evaluated as part of the periodic reviews performed for the site.

Response Action Performance

Response actions have been completed at the following properties at the SLDS: Plants 1, 6E, 7 East (7E), 7N, 7S, and 9; Norfolk Southern Railroad (DT-3), Gunther Salt (DT-4); Heintz Steel and Manufacturing (DT-6); Midwest Waste (DT-7); PSC Metals, Inc. (DT-8), TRRA (DT-9), Thomas and Proetz Lumber Company (DT-10); City of Venice, Illinois (DT-11); BNSF Railroad (DT-12); Christiana Court (DT-17); Midtown Garage (DT-29); and the TRRA Soil Spoils Area. Response actions are in progress at some properties, such as Plant 6WH, the City Property VP (DT-2), and the Kiesel Hall Street Property. Response actions will be performed for Mallinckrodt and the remaining VPs. A summary of completed and ongoing remedial activities at the SLDS is presented in Table IV-1 and discussed in detail in Section IV.

The past and present excavation and off-site disposal of accessible soil above the RGs at the SLDS are being performed as prescribed in the SLDS ROD. Completed activities have met the RGs and have achieved the soil RAOs. However, to achieve the RGs and RAOs, the volume of material excavated has been greater than the volumes estimated in the SLDS ROD. Indiscriminate dumping, air dispersion, unknown and abandoned utilities acting as preferential pathways, and surface and subsurface waterborne transport of particles all may have played a greater role in contaminant distribution than originally thought. The change in volumes did not affect the protectiveness of the response action.

Verification sampling (i.e., an FSS) was conducted for each excavated area. The results of the FSSs for the remediated properties at the SLDS are summarized in the tables in Appendix B. The FSS results and the risk and dose assessments demonstrate that the accessible soil left in place at the remediated properties satisfies the SLDS ROD RGs.

The remedial action for the SLDS is achieving the RAO for ground water that requires removal of the sources of COCs in the HU-A. The goal of the ground-water portion of the remedy is to monitor the usable aquifer (HU-B) to assure it is protected through the source removal; however, arsenic and uranium have been detected in HU-B wells at levels exceeding the ILs established in the SLDS ROD. A GRAAA has been initiated as required by the SLDS ROD. The second phase of the GRAAA (i.e., the investigation phase) will be conducted following completion of remedial activities at Plant 6WH to assess if remediation results in a decrease in the COC concentrations

in HU-B ground water. The results of this assessment will be presented in a subsequent five-year review report.

Systems Operations/Operations and Maintenance

Past and current system operations and O&M activities include annual well inspections and maintenance of access controls. O&M documents for the SLDS include the GRAAA. These activities are effective in maintaining the protectiveness of the remedy. No large variances in O&M costs are anticipated.

Opportunities for Optimization

Opportunities continue to exist for optimization of the environmental monitoring system. The sampling locations, frequencies, and target constituents will be modified on the basis of historical data, trends, and the progress of the remedial action. Further opportunities for optimization were not identified in this five-year review.

Early Indicators of Potential Issues

As discussed previously, the only early indicator of potential issues was the exceedance of the ILs in the HU-B aquifer. Ground-water samples from HU-B monitoring wells have exceeded the SLDS ROD-specified ILs for total uranium and arsenic over an extended period. The ILs are 50 µg/L for arsenic and 20 µg/L for total U.

Implementation of Institutional Controls and Other Measures

No permanent institutional controls have been required at this stage of the CERCLA process to prevent exposure. For accessible soil, areas remaining after remediation meet the criteria for unrestricted use. For areas not yet remediated, access controls, a notification process, and an excavation permit process are sufficient to prevent or minimize exposure. In addition, USACE personnel conduct site visits on a regular basis to verify if any intrusive activities are being conducted by property owners or utility workers at the SLDS. At the Mallinckrodt Property, Mallinckrodt notifies the USACE prior to conducting excavation activities at the SLDS.

Mallinckrodt provides the primary access controls on its property through site security, badging, and perimeter fencing. In addition, prior to remedial activities at any property, temporary fences, gates, and/or barriers are installed around the work zone, warning signs are posted at designated intervals, and specific points are established for ingress and egress. Anyone not involved in the remediation is restricted from entry into the construction zone. As conditions change, controls are modified to restrict access. When it is necessary to close a road or sidewalk due to construction, alternate routes are provided.

Current practices used to control exposures include USACE radiation safety support to utility operations. In addition, notification letters are sent to property owners informing them that FUSRAP contamination exists on their property and that the USACE will assist them in any property development or improvement efforts. Letters are sent out periodically to provide the affected property owners with updated contacts for assistance.

The USACE is currently in the process of developing the CERCLA documentation necessary to address inaccessible soil at the SLDS. Areas with soil contamination under permanent structures are part of the ISOU and are outside the scope of this five-year review. A long-term stewardship plan may be required to document processes and procedures with respect to requirements under the CERCLA.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of response selection still valid?

Answer B: Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of response selection are still valid, and any changes in these values have no impact on the protectiveness of the remedy.

Changes in Exposure Pathways

There have been no changes in land use, no change in the understanding of the physical site conditions, and no new COCs. There are no unanticipated toxic by-products from the remedy.

Changes in Exposure Assumptions

Since the Second Five-Year Review Report (USACE 2010a), the USEPA has published the *Exposure Factors Handbook: 2011 Edition* (2011 Exposure Factors Handbook) (USEPA 2011). The 2011 Exposure Factors Handbook is the update of an earlier version published in 1997 (USEPA 1997b). The purpose of the 2011 Exposure Factors Handbook is to (1) summarize data on human behaviors and characteristics that affect exposures to environmental contaminants, and (2) recommend numerical values for exposure factors representing those behaviors and characteristics that can be used to quantify the magnitude of exposure that may occur to an individual over a specified duration of time. Based on the information provided in the 2011 Exposure Factors Handbook, the USEPA Office of Solid Waste and Emergency Response (OSWER) more recently published updated standard exposure factor default values in OSWER Directive 9200.1-120 *(Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors)* (USEPA 2014a). The recommended values or ranges of values provided within both of these exposure factors guidance resources (USEPA 2011, 2014) are not legally binding on any USEPA program, but rather are suggested inputs for exposure and risk calculations, that can be modified as needed. Updates in exposure factors specific to the SLDS are discussed as follows, along with a statement for each existing exposure factor as to whether or not the factor is still considered valid. An "existing" exposure factor is one that is presented in the *Feasibility Study for the St. Louis Downtown Site* (SLDS FS) (USACE 1998d) and/or is currently used in post-remedial risk evaluations, and is a factor for which update values have not previously been made available by the USEPA. The SLDS FS presents most exposure factors used in the derivation of RGs considered protective of human health. An existing exposure factor from the SLDS FS is considered to still be health protective, relative to the remedy, in one of two ways: (1) there have been no updates to the existing exposure factor, or (2) the existing exposure factor is more health conservative than the corresponding update considered appropriate for the SLDS. An existing exposure factor is considered to be outdated if the corresponding update is more health conservative. However, a determination of an outdated exposure factor is not necessarily indicative of a recommendation that the factor, and consequently, the RG should be updated. Rather, the determination of at least one outdated factor triggers a post-remedial risk evaluation that incorporates all current (including updated) exposure values to determine the overall health protectiveness of the remedy. The risk evaluation is discussed in the subsection titled "Health Protectiveness of the Remedy."

Radiological dose and risk assessments for accessible soil areas have historically been conducted, and continue to be conducted, under the SLDS ROD to demonstrate that SLDS ROD RGs (based on 40 *CFR* 192, Subparts B and C) have been attained. All exposure factors and input values used for past and ongoing post-remedial RESidual RADioactivity (RESRAD)

(computer model) dose and risk calculations for the SLDS properties are presented in Table VII-1. Likewise, exposure factors used in the derivation of risk-based SLDS ROD RGs for metals are presented in Table VII-2. The exposure factors used for derivation of metal RGs are presented in Section 2.6.3 of the SLDS FS (USACE 1998d). With the exception of a few factors, such as the dermal absorption factors and soil-to-skin adherence factors, most factors are presented.

To date, the only SLDS exposure factors for which updated values are available for use at the SLDS are the adult body weight, the skin surface area available for exposure, and the soil-to-skin adherence factor. The USEPA has updated the adult body weight from 70 to 80 kilograms (kg). Application of the updated value for adult body weight in a risk assessment would result in a reduction of CRs and HIs from those that would be estimated for adult exposures using the SLDS FS value. Therefore, the SLDS FS value for adult body weight is still valid.

The skin surface area available for exposure is only used in risk calculations for dermal exposures to metals and is not used for any radiological dose and risk calculations. None of the radiological exposure factors or RESRAD input values have changed since the Second Five-Year Review Report. In the SLDS FS, a value of 5,800 square centimeters (cm^2) was assumed for industrial/construction workers and utility workers. This value is more health conservative than the current value of 3,470 cm^2 used by the USEPA for deriving the most recent set of Regional Screening Levels (RSLs) (USEPA 2015a). In other words, incorporation of the updated surface area into a metals risk assessment calculation would result in a reduction of CRs and HIs from those that would be obtained by using the SLDS FS value. Therefore, the SLDS FS skin surface area value is still valid.

Finally, the *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors* (USEPA 2014a) has updated the soil-to-skin adherence factor for an adult worker from 0.1 to 0.12 milligrams per square centimeter (mg/cm^2). Because the updated value is slightly more health conservative than the SLDS FS value, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Changes in Toxicity or Contaminant Characteristics

No changes have occurred in the characteristics of the radiological and metal COCs identified for the SLDS; however, since finalization of the Second Five-Year Review Report for the FUSRAP SLS, both radiological and metal toxicity factors have been updated, as discussed in the following sections.

Radiological Contaminants of Concern

Post-remediation residual radionuclide risk and dose assessments are conducted on individual properties/areas associated with the SLDS ROD (USACE 1998a). Post-remedial risk and dose estimates summarized in the SLDS ROD were calculated using RESRAD Version 5.621 using Federal Guidance Report (FGR)-11 (USEPA 1988) and FGR-12 (USEPA 1993) dose conversion factors (DCFs) and the *Health Effects Assessment Summary Tables (HEAST), FY 1997 Update* (1997 HEAST) (USEPA 1997c) cancer slope factors (CSFs). For the SLDS radiological COCs, the *Health Effects Assessment Summary Tables (HEAST)* (2001 HEAST) (USEPA 2001b) CSFs resulted in a slightly more conservative remedial risk than those for 1997 HEAST CSFs. The 2001 HEAST CSFs were based on those presented in FGR-13 (USEPA 1999). The pre-design investigation report (PDIR)-FSSE report and PRAR-FSSE report residual risk and dose

assessments for the SLDS were conducted using the most current version of RESRAD at the time, as well as the FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs.

In late 2014, the USEPA updated the CSFs associated with the online, web-based preliminary remediation goal (PRG) calculator. The new CSFs were calculated by Oak Ridge National Laboratory (ORNL) using dose and risk calculation (DCAL) software in the manner of FGR-12 and FGR-13 for internal intakes and for external exposure, respectively, and were based on International Commission on Radiological Protection (ICRP)-107. ICRP-107 contains a revised database of nuclear decay data (energies and intensities of emitted radiations, physical half-lives and decay models) for 1,252 naturally occurring and manmade radionuclides and supersedes the previous database, ICRP-38 published in 1983.

In 2014, RESRAD Version 7.0 was released. RESRAD Version 7.0 extended its DCF database and software capability to include the new DCFs and CSFs associated with the USEPA PRG calculator. RESRAD Version 7.0 allows the user to select from 14 different DCF and CSF libraries: DCFPAK 3.02 (adult, infant, age 1, age 5, age 10, and age 15); DOE STD-1126-2001 (reference person); FGR-11 (FGR-13 or 2001 HEAST CSFs); and ICRP-72 (adult, infant, age 1, age 5, age 10, and age 15). Based on an evaluation of the CSFs and DCFs conducted over the range of age groups, future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. This evaluation is presented in Appendix F, Attachment F-1.

Tables VII-3A and VII-3B present the updated 2014 radiological CSFs and DCFs, respectively, for the radiological COCs, in comparison with the corresponding CSFs and DCFs that have been previously used by the USACE in post-remedial risk and dose calculations in PDIR-FSSE reports and PRAR-FSSE reports through March 2015. The COCs presented represent parent radionuclides, and past RESRAD risk and dose calculations have always included CSFs and DCFs for progenies due to ingrowth throughout the 1,000-year period evaluated as part of the PDIR-FSSE reports and PRAR-FSSE reports. This methodology will continue to be applied when using the updated CSFs and DCFs in future risk and dose calculations conducted using RESRAD Version 7.0.

In both Tables VII-3A and VII-3B, gray-shaded cells indicate those updated 2014 CSFs and DCFs that are greater (i.e., more health conservative) than the corresponding older values (i.e., 2001 HEAST CSFs and FGR-11 and FGR-12 DCFs). Those cells that are not shaded gray indicate that the updated CSFs and DCFs are either equal to or less than the corresponding older values. The tables also present the percent change (i.e., increase or decrease) in CSFs and DCFs when comparing the updated 2014 values with the corresponding older values, with the positive percentages indicating that the CSF and DCF values have increased over the older values as a result of the updates, and the negative percentages indicating that the values have decreased with the updates. A zero (0) is presented as the percent change if the 2014 updates resulted in no increase or decrease to the CSF s and DCFs.

Table VII-3A shows the changes in CSFs from the previously used 2001 HEAST values to the updated 2014 USEPA values. The soil ingestion CSFs decreased for all radiological COCs. Most of the food ingestion CSFs remained unchanged, with the values for two COCs (Ra-228 and U-235) showing a slight decrease as a result of the 2014 updates. However, increases in inhalation exposure and external exposure CSFs occurred for a number of COCs. For inhalation, the 2014 updates resulted in CSF increases for the following COCs: Pa-231, lead (Pb)-210, Ra-226, Ra-228, Th-230, U-234, U-235, and U-238. The percent increases ranged from a minimum of 20 percent (Th-230) to a maximum of 744 percent (Ra-228). Because inhalation is not a significant pathway contributor of cancer risk at the SLDS, the increased CSFs would be

unlikely to change the outcomes of past post-remedial risk evaluations conducted for SLDS properties in terms of changing health protectiveness. However, the use of the new inhalation CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in slight CSF increases for the following COCs: Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. The percent increases ranged from a minimum of 0.4 percent (U-234) to a maximum of 148 percent (U-238). Previously, a 2001 HEAST CSF of 0 risk/year per pCi/g was indicated for Ra-228. This has been updated by OSWER Directive 9200.1-120, *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors* (USEPA 2014), to 3.43E-11 risk/year per pCi/g based on the CSF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in ICRP-107. External exposure is a significant pathway contributor of cancer risk at the SLDS, mainly because post-remedial risk evaluations are conducted assuming that no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure CSFs are primarily slight in magnitude, the increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for SLDS properties, in terms of health protectiveness determinations. However, the use of the new external exposure CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-3B shows the changes in DCFs from the previously used FGR-11 and FGR-12 values to the updated ORNL 2014 values. The ingestion DCFs, which are applicable to both soil and food ingestion, decreased for all radiological COCs, with the exception of Ra-228 and Th-230, which increased by 79 percent and 45 percent, respectively. Because most of the DCFs for the radiological COCs decreased as a result of the 2014 updates, the increased DCFs for Ra-228 and Th-230 would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for SLDS properties, in terms of health protectiveness determinations. However, the use of the new ingestion DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For inhalation, the 2014 updates resulted in DCF increases for the following COCs: Pb-210, Ra-226, Ra-228, and Th-230. The percent increases ranged from a minimum of 15 percent (Th-230) to a maximum of 1,145 percent (Ra-228). Because inhalation is not a significant pathway contributor of dose at SLDS properties, the increased DCFs would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for SLDS properties in terms of changing health protectiveness. However, the use of the new inhalation DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in a 66 percent increases in the DCF for U-238. Previously, an FGR-11 and FGR-12 DCF of 0 mrem/yr per pCi/g was indicated for Ra-228. This has been updated by *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) to 6.58E-05 mrem/yr per pCi/g, based on the DCF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in

ICRP-107. External exposure is a significant pathway contributor of dose at the SLDS, mainly because post-remedial risk evaluations are conducted assuming that no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure DCFs for Ra-228 and U-238 would be offset by the decreases in DCFs for the other COCs, the Ra-228 and U-238 DCF increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for SLDS properties, in terms of health protectiveness determinations. However, use of the new external exposure DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Metal Contaminants of Concern

Since issuance of the SLDS ROD, changes have been made to carcinogenic and noncarcinogenic toxicity factors for metal COCs (arsenic and cadmium) used in the SLDS FS. The SLDS FS factors used for deriving the SLDS ROD RGs and the corresponding updated factors are presented in Tables VII-4A and VII-4B for carcinogenic and chronic noncarcinogenic toxicities, respectively.

The toxicity criteria used to derive soil RGs for metals are presented in Table 2-15 of the SLDS FS (USACE 1998d). A toxicity factor used in the SLDS FS is considered to be health protective (i.e., valid), relative to current information, in one of two ways: (1) no updates to the toxicity factor have occurred since issuance of the SLDS ROD, or (2) the SLDS FS toxicity factor is more health conservative than the corresponding update considered appropriate for the SLDS. A toxicity factor used in the SLDS FS is considered outdated if the corresponding update is more health conservative. However, a determination of an outdated toxicity factor is not necessarily indicative of a recommendation that the factor, and consequently the RG, should be updated. Rather, the determination of at least one outdated factor triggers a post-remedial risk evaluation that incorporates all current (including updated) toxicity values to determine the overall health protectiveness of the remedy. The risk evaluation is discussed in the subsection titled "Health Protectiveness of the Remedy."

The following paragraphs briefly describe toxicity factor updates and the expected impacts of the individual updates on the health protectiveness of the remedy. Along with the numerical toxicity factors, Tables VII-4A and VII-4B present the sources of the updated factors (i.e., the document[s] in which the factors were developed), and the tiers associated with the sources of the updated factors relative to the USEPA hierarchy of toxicological sources (USEPA 2003). This information is included in the footnotes to the tables.

Arsenic

For carcinogenic evaluations, the dermal cancer slope factor (CSF_d) for arsenic has decreased from the SLDS FS value of 3.66 to 1.50 (milligrams per kilogram-day [mg/kg-day])$^{-1}$. The CSF_d is calculated by dividing the oral cancer slope factor (CSF_o) by the gastrointestinal absorption factor (GIABS). The CSF_d for arsenic has decreased as a result of a change in the GIABS, resulting in a lower CR, if the CSF_d were to be used in risk calculations. Because the CSF_d has changed to a less conservative value, use of the SLDS FS CSF_d is still valid, with no impact to the health protectiveness of the remedy.

In addition to the change in the CSF_d, and since the SLDS FS and SLDS ROD, a dermal absorption fraction (ABS) of 0.03 has been established, per the *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for*

Dermal Risk Assessment) (RAGS Part E) (USEPA 2004). Because no documented ABS value could be found for arsenic in the SLDS FS or SLDS ROD, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

During development of the SLDS FS, no inhalation toxicity factor (i.e., inhalation reference dose [RfD_i] or reference concentration [RfC]) was available for arsenic. Currently, a Tier 3 inhalation RfC of 0.000015 milligram per cubic meters (mg/m^3) is available through the California Environmental Protection Agency (CALEPA) (CALEPA 2015). The use of the new RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for arsenic; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Cadmium

For noncarcinogenic evaluations, the chronic dermal reference dose (RfD_d) for cadmium has increased from the SLDS FS value of 0.00001 to 0.000025 mg/kg-day. The RfD_d is calculated by multiplying the oral reference dose (RfD_o) by the GIABS. The RfD_d for cadmium has increased as a result of a change in the GIABS, and would result in a lower HI if the updated RfD_d were to be used in a risk assessment. Because the RfD_d has changed to a less conservative value, use of the SLDS FS RfD_d is still valid, with no impact to the health protectiveness of the remedy.

In addition to the change in the RfD_d, and since the SLDS FS and SLDS ROD, a dermal ABS of 0.001 has been established, per the RAGS Part E (USEPA 2004). Because no documented ABS value could be found for cadmium in the SLDS FS or SLDS ROD, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Finally, the inhalation RfC for cadmium was updated by the Agency for Toxic Substances and Disease Registry (ATSDR) from 0.0002 mg/m^3 to the Tier 3 value of 0.00001 mg/m^3 (ATSDR 2012b). The use of the new RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for cadmium; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Changes in Risk Assessment Methods

During preparation of the Second Five-Year Review Report (USACE 2010a), the USEPA developed the *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)* (RAGS Part F) to address human health risk related to inhalation exposures (USEPA 2009a). This change affects risk assessments conducted for metals at the SLDS, but the change does not affect the radiological evaluations. The previously established *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)* (RAGS Part A) (USEPA 1989) methodology determines chemical intake that is dependent on inhalation rate and body weight. However, the RAGS Part A methodology is no longer consistent with the current USEPA Inhalation Dosimetry Methodology (per RAGS Part F). This is because it has been determined that the amount of chemical reaching the target site is not a simple function of inhalation rate and body weight. Instead, the interaction between the inhaled contaminant and the respiratory tract is affected by factors such as species-specific relationships of exposure concentrations to deposited/delivered doses and physiochemical characteristics of the inhaled contaminant. The target site where the toxic effect occurs is also considered when applying dosimetric adjustments to experimental concentrations. RAGS Part F provides a methodology for incorporating concentration-based toxicity criteria (i.e., RfCs for noncarcinogenic effects and inhalation unit

risks [IURs] for carcinogenic endpoints) into inhalation risk calculations. The RfCs and IURs now supersede the previously used inhalation reference doses (RfDs) and CSFs, respectively, that were based on intake. Using equations presented in the RAGS Part F, calculations were performed to convert current RfCs and IURs to the equivalent RfD and CSF values, and vice versa. For the sake of conducting comparative evaluations to determine the validity of toxicity criteria used in the SLDS FS versus current values, both sets of inhalation toxicity criteria are presented in Table VII-4. Because the inhalation exposure pathway is a minor contributor to the overall risk to an industrial receptor at the SLDS, this change in inhalation risk assessment methodology does not impact the health protectiveness of the remedy. This is further demonstrated by the risk evaluations discussed in the "Health Protectiveness of the Remedy" section.

Health Protectiveness of the Remedy

Radiological Contaminants of Concern

As previously discussed, based on an evaluation of the CSFs and DCFs conducted over the range of age groups (see Appendix F, Attachment F-1), future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. Additionally, the evaluation indicates no substantial difference in risk between using the 2001 HEAST and FGR-13 CSFs and the DCFPAK 3.02 (adult) CSFs (i.e., 2014 USEPA PRG CSFs based on ICRP-107) for St Louis FUSRAP receptors. Similarly, the evaluation in Appendix F, Attachment F-1 shows no difference in dose results between the FGR-11 and FGR-12 DCFs and the DCFPAK 3.02 (adult) DCFs. Therefore, application of the updated DCFPAK 3.02 (adult) CSFs and DCFs in future St. Louis FUSRAP residual risk and dose assessments will not likely result in a property meeting the criteria for unrestricted (i.e., per the SLDS ROD) when, in fact, it does not meet the SLDS ROD criteria for unrestricted use based on calculations using the previous CSFs (i.e., from the 2001 HEAST) and DCFs (i.e., from FGR-11 and FGR-12).

Another concern arising from the use of the DCFPAK 3.02 (adult) CSFs and DCFs is the impacts on the health protectiveness of accessible soil areas at SLDS properties already met the criteria for unrestricted use. Of particular concern are those properties associated with the most elevated resident gardener risks as determined in the PDIR-FSSE reports and PRAR-FSSE reports. Therefore, a second evaluation has been conducted for a property (DT-10) representing the most elevated risk and dose estimated during a PRAR-FSSE assessment. This evaluation for DT-10 (see Appendix F, Attachment F-2), applied all of the same EPCs, exposure assumptions, and RESRAD model inputs, that were used in the PRAR-FSSE report, with the exceptions that RESRAD Version 7.0, along with the updated DCFPAK 3.02 (adult) CSFs and DCFs have been used in this evaluation. Table VII-5 shows no significant differences between the PRAR-FSSE report risk and dose results and those obtained in this five-year review evaluation using the DCFPAK 3.02 (adult) CSFs and DCFs.

In summary, based on the evaluation of DT-10 as being associated with the most elevated risk and dose estimated in a PRAR-FSSE report, the remedy being implemented at the SLDS Accessible Soil and Ground-Water OU to address MED/AEC-related radiological contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Metal Contaminants of Concern

As part of this five-year review, all of the updated exposure assumptions and toxicity data, as well as the updated inhalation risk methodologies (i.e., per RAGS Part F), have been collectively incorporated into human health risk calculations for metal COCs at remediated SLDS properties to determine the overall impact of the updates to the continued protectiveness of the remedy for industrial land use (see Appendix F, Attachment F-3). The use of the updated factors in this five-year review is not a recommendation for updating the risk-based RGs established in the SLDS ROD. Rather, the risk evaluations are a verification that remediation to meet the SLDS ROD RGs results in residual concentrations that continue to be health protective in light of the most recent exposure and toxicity data available, and that the exposure assumptions and toxicity factors used to derive the RGs are still valid.

The risk evaluations were conducted using the industrial worker/construction worker and the utility worker receptor scenarios at Plant 2 and DT-10, in a manner consistent with the SLDS FS and SLDS ROD, to demonstrate compliance with the requirement of meeting industrial land use. Although additional evaluations of a hypothetical resident were performed in the PRAR-FSSE reports for these properties, meeting residential land use is not necessary for meeting the requirements of the SLDS ROD, because the current and expected future land use of the SLDS is industrial. Therefore, residential evaluations were not performed in this five-year review.

Plant 2 and DT-10 were evaluated because they are located within the boundary of the former uranium ore processing area, which defines the area in which uranium ore-related metals were most likely to have been released into the environment during past MED/AEC processes, according the SLDS ROD. With the exception of remedial actions associated with a formerly inaccessible sewer line at Plant 2, all remedial actions have been completed at Plant 2 and at DT-10 under the authority of the SLDS ROD. Consequently, final datasets are available for the risk evaluations of these properties in this five-year review. The final datasets include the latest investigation and post-remedial verification results, the latter of which is comprised of residual soil concentrations that remain in areas where remediation was performed to meet the risk-based RGs for arsenic and cadmium. The final datasets were used to compute EPCs for Plant 2 and DT-10 to facilitate the risk evaluations. Plants 6 and 7 are also within the boundary; however, because remedial actions are ongoing at these properties, final soil datasets are not yet available for conducting risk evaluations in this five-year review.

Both noncancer HIs and CRs were calculated for industrial/construction worker and utility worker exposures to arsenic and cadmium in soil at Plant 2 and DT-10. Tables VII-6 and VII-7 present the HIs and CRs, respectively, estimated for both properties. Cumulative CRs and target organ HIs (i.e., total CRs and HIs summed over both COCs) were compared to USEPA acceptable limits of $1x10^{-4}$ and 1, respectively. CR and target organ HI values estimated to be less than these limits indicate that the current remedy being used to meet the RGs, per the SLDS ROD, is still health protective. Tables VII-6 and VII-7 indicate that all cumulative target organ HIs and CRs estimated for Plant 2 and DT-10 are less than USEPA acceptance criteria.

In summary, the remedy being implemented at the SLDS Accessible Soil and Ground-Water OU to address MED/AEC-related metals contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Remediation Goals

RGs were established in the SLDS ROD for radiological COCs in soil based on the authority provided by 40 *CFR* 192, Subpart B. PRAR-FSSE reports for properties that have been remediated to meet those RGs have demonstrated the health protectiveness of the remedy. Because there have been no changes to these regulations since the Second Five-Year Review Report (USACE 2010a), the existing radiological RGs are still valid.

Risk evaluations were performed using post-remediation concentrations of metal COCs (arsenic and cadmium) measured in soil at Plant 2 and DT-10 that included updated exposure factors and toxicity values relative to those originally used to derive the risk-based RGs in the SLDS FS and SLDS ROD. The results of the evaluations demonstrate that the residual soil concentrations of the metal COCs at both properties are health protective. Therefore, the metal RGs are still valid for application at the SLDS.

Expected Progress Toward Meeting Remedial Action Objectives

RAOs were established for soil and ground water at the SLDS in the SLDS ROD. The RAOs for the SLDS are presented in Table VII-8.

The RAOs are still considered valid and continue to guide remedial actions at the SLDS. As stated previously, excavation and off-site disposal of contaminated soil is being performed as prescribed in the SLDS ROD. Completed activities have met the RGs. A GRAAA has been initiated for the HU-B aquifer to address exceedance of the ILs as cited in the SLDS ROD.

Question C: Has any other information come to light that could call into question the protectiveness of the response action?

Answer C: No, there have been no newly identified ecological risks, impacts from natural disasters, or other information that has come to light that could affect the protectiveness of the remedy.

LATTY AVENUE PROPERTIES (THE HISS AND FUTURA AND THE LATTY AVENUE VPs)

Question A: Is the response action functioning as intended by the decision documents?

Answer A: Yes, the response action is functioning as intended by the decision documents.

The NC ROD (USACE 2005a) states:

> The main components of the selected remedy include:
>
> - Excavate all accessible contaminated soils to remediation goals (RGs) that support unlimited use and unrestricted exposure (UUUE) and dispose off-site at a permitted facility;
> - Impose use restrictions at areas under roads, active rail lines and other permanent structures where the residual condition is not consistent with UUUE;
> - Dredge contaminated sediments from Coldwater Creek to RGs that support UUUE;
> - Remove contaminated soils from the surfaces of buildings and structures as necessary to achieve RGs that support UUUE, or remove the contaminated structures themselves and dispose off-site at a permitted facility;

- Monitor ground water and surface water during the soil remediation period to ensure water quality is not adversely effected and identify any areas where ground water may be significantly degraded; and,
- Monitor ground water long-term in selected areas where soils contaminated above RGs are left in place or where contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

Response Action Performance

Response actions have been completed at the following Latty Avenue Properties: the HISS and Futura, VP-01(L) and Parcel 10K530087, VP-02(L), and VP-04(L). No response actions were required at VP-03(L), VP-05(L), or VP-06(L). The excavation and off-site disposal of contaminated material from each of these properties were performed as prescribed in the NC ROD. Completed activities have met the RGs and have achieved the RAOs. A summary of completed and ongoing remedial activities at the Latty Avenue Properties is presented in Table IV-4 and discussed in detail in Section IV. PRAR-FSSE reports documenting that the properties have met the NC ROD RGs have been completed for all remediated properties except VP-40A (partial) and the buildings at VP-01(L). An addendum to the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087* (USACE 2010e), which will address the buildings at VP-01(L), is currently being prepared.

Systems Operations/Operations and Maintenance

Past and current system operations and O&M activities include the annual well inspections, implementation and maintenance of access controls. These activities are effective in maintaining the protectiveness of the remedy. No large variances in O&M costs are anticipated.

Opportunities for Optimization

Opportunities continue to exist for optimization of the environmental monitoring system. The sampling locations, frequencies, and target constituents will be modified on the basis of historical data, trends, and the progress of the remedial action. Further opportunities for optimization were not identified in this five-year review.

Early Indicators of Potential Issues

No potential issues were identified as a result of the site inspections at the Latty Avenue Properties.

Implementation of Institutional Controls and Other Measures

No permanent institutional controls are required at this stage of the CERCLA process to prevent exposure. COCs remaining at the site will be addressed under the selected remedy identified in the NC ROD. Until then, a fence and appropriate signage is maintained around the HISS and Futura properties.

Prior to response activities at any property, temporary fences, gates, and/or barriers are installed around the work zone, warning signs are posted at designated intervals, and specific points are established for ingress and egress. Anyone not involved in the remediation is restricted from entry into the construction zone. As conditions change, controls are modified to restrict access.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of response selection still valid?

Answer B: Yes, the exposure assumptions, toxicity data, cleanup levels, and response action objectives used at the time of response selection are still valid and any changes in these values have no impact on protectiveness.

Changes in Exposure Pathways

There have been no changes in land use, no change in the understanding of the physical site conditions, and no new COCs. There are no unanticipated toxic by-products from the remedy.

Changes in Exposure Assumptions

Since the Second Five-Year Review Report (USACE 2010a), the USEPA has published the 2011 Exposure Factors Handbook (USEPA 2011). Based on the information provided in the 2011 Exposure Factors Handbook, the USEPA more recently published updated standard exposure factor default values in OSWER Directive 9200.1-120 *(Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors)* (USEPA 2014a). A discussion of both guidance resources (USEPA 2011, 2014a), along with the updated exposure factors contained therein, is provided in the previous section for the SLDS. Updates in exposure factors specific to the Latty Avenue Properties are discussed as follows, along with a statement for each existing exposure factor as to whether or not the factor is still considered valid. For the Latty Avenue Properties, an "existing" exposure factor is one that is presented in Table D.2 of the *Feasibility Study for the St. Louis North County Site* (NC FS) (USACE 2003a) and/or is currently used in post-remedial risk evaluations, and is a factor for which updates previously have not been made available by the USEPA. The determination of the current validity of an existing exposure factor is conducted in the same manner as previously discussed for the SLDS exposure factors. The determination of at least one outdated factor (i.e., a factor for which a more health-conservative value is currently recommended by the USEPA) triggers a post-remedial risk evaluation that incorporates all current (including updated) exposure values to determine the overall health protectiveness of the remedy. The risk evaluation is discussed in the subsection titled "Health Protectiveness of the Remedy."

Radiological dose and risk assessments for the Latty Avenue Properties have historically been conducted, and continue to be conducted under the NC ROD to demonstrate that NC ROD RGs (based on 40 *CFR* 192 Subparts B and C and 10 *CFR* 40 Appendix A [Criterion 6(6)]) have been attained. All exposure factors and input values used for past and ongoing post-remedial RESRAD dose and risk calculations for the Latty Avenue Properties are presented in Table VII-9. Likewise, exposure factors used in the derivation of risk-based NC ROD RGs for metals are presented in Table VII-10. Both Tables VII-9 and VII-10 apply to the risk evaluations of all North St. Louis County Sites. Exposure factors are used for evaluations of the following receptor scenarios at the Latty Avenue Properties: industrial worker, construction worker, utility worker, road worker, maintenance worker, recreational user/trespasser (assumed to be ages 6 to 14 years old), resident child (ages 0 to 6 years old), resident adult (ages 7 and older), and the age-adjusted resident (assumes exposure is represented by an age-weighted average for an individual living at a property, as both a child then an adult). To date, the USEPA has updated values for the following exposure factors:

- exposure duration for an adult living at one residence (reduced from 24 to 20 years),
- body weight for a recreational user/trespasser, ages 6 to 14 years (reduced from 50 to 44.3 kg),
- body weight for an adult (increased from 70 to 80 kg),

- body weight for a young child, ages 0 to 6 years (reduced to 15 kg),
- skin surface areas for all receptors (reduced for all receptors except for a recreational user and a resident adult, which have increased [see Table VII-10]),
- soil-to-skin adherence factors for the industrial worker, maintenance worker, recreational user/trespasser, young child resident, adult resident, and age-adjusted resident (see Table VII-10), and
- particulate emission factors (PEFs) for workers (decreased to the more conservative value of 1E+07 cubic meters per kilogram [m^3/kg], which corresponds to the default inhalation mass loading factor used in the RESRAD model).
- PEFs for recreational users/trespassers and residents (increased to the current, less stringent USEPA standard default value of 1.36E+09 m^3/kg).

The updates in exposure duration for a resident adult, adult and young child body weights, adult and young child skin surface areas available for exposure, and soil-to-skin adherence factors (all presented previously) affect the calculations of the following age-adjusted intake rates for a composite child/adult residential receptor that are used in the evaluations for residential CRs at the Latty Avenue Properties:

- age-adjusted soil ingestion rate and
- age-adjusted dermal factor for soil.

Tables VII-9 and VII-10 show that all of these exposure factor updates, with the exception of the exposure duration for an adult resident, are applicable to risk calculations for metal exposures only and do not impact radiological dose and risk calculations. In radiological risk evaluations, the exposure duration for adult residents shown in Table VII-9 results in an increase in the age-adjusted soil ingestion rate and soil ingestion risk and dose. However, the reduced exposure duration results in a reduction in risk and dose estimated for the external radiation exposure route. Because external radiation is the predominant radiological pathway at the Latty Avenue Properties, the net result of the decreased exposure duration for an adult resident is a slight decrease in risk and dose from those that would be estimated using the NC FS value. Otherwise, none of the radiological exposure factors and RESRAD input values have changed since the Second Five-Year Review Report.

For metals, Table VII-10 presents footnote(s) for each updated factor that cite the source(s) of the factor, and also provides information relevant to the updates in the "Comments" column. Table VII-10 shows that of the previously listed factor updates, the following factors would result in less risk during a risk calculation and therefore are less health conservative than those in the NC FS (USACE 2003a):

- body weight for the adult,
- exposure duration for the adult resident,
- skin surface areas for all workers and the resident child,
- soil-to-skin adherence factors for the recreational user/trespasser and resident adult, and
- PEF for the recreational user/trespasser and residents.

Use of the remaining factor updates in Table VII-10 (i.e., in gray-shaded cells) in a risk assessment would result in higher risks than those that would be estimated using the NC FS exposure factors. Because many of the updated exposure factors are more health conservative than those used in the NC FS, all of the most current exposure factors have been incorporated

into evaluating risks due to exposures to post-remedial metals concentrations in soil at the following Latty Avenue Properties.

- HISS,
- Parcel 10K530087,
- VP-02(L), and
- Futura.

The properties listed previously were evaluated because (1) soil samples were collected and analyzed for metals, and (2) the PRAR-FSSE reports, including the metals datasets therein, have been finalized. The results of the metals risk evaluations are discussed in the section titled "Health Protectiveness of the Remedy."

Changes in Toxicity or Contaminant Characteristics

No changes have occurred in the characteristics of the radiological and metal COCs identified for the Latty Avenue Properties; however, since finalization of the Second Five-Year Review Report for the FUSRAP SLS, both radiological and metal toxicity factors have been updated, as discussed in the following sections.

Radiological Contaminants of Concern

Post-remediation residual radionuclide risk and dose assessments are conducted on individual properties/areas associated with the NC ROD (USACE 2005a). Post-remedial risk and dose estimates summarized in the NC ROD were calculated using RESRAD Version 5.82 using FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs. For the Latty Avenue Properties radiological COCs, the 2001 HEAST CSFs resulted in a slightly more conservative remedial risk than those for the 1997 HEAST values. The 2001 HEAST CSFs were based on those presented in FGR-13 (USEPA 1999). The PDIR-FSSE reports and PRAR-FSSE report residual risk and dose assessments conducted for the Latty Avenue Properties were conducted using the most current version of RESRAD at the time, as well as the FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs.

In late 2014, the USEPA updated the CSFs associated with the online, web-based PRG calculator. The new CSFs were calculated by ORNL using DCAL software in the manner of FGR-12 and FGR-13 for internal intakes and for external exposure, respectively, and were based on ICRP-107. ICRP-107 contains a revised database of nuclear decay data (energies and intensities of emitted radiations, physical half-lives, and decay models) for 1,252 naturally occurring and manmade radionuclides and supersedes the previous database, ICRP-38 published in 1983.

In 2014, RESRAD Version 7.0 was released. RESRAD Version 7.0 extended its DCF database and software capability to include the new DCFs and CSFs associated with the USEPA PRG calculator. RESRAD Version 7.0 allows the user to select from 14 different DCF and CSF libraries: DCFPAK 3.02 (adult, infant, age 1, age 5, age 10, and age 15); DOE STD-1126-2001 (reference person); FGR-11 (FGR-13 or 2001 HEAST CSFs); and ICRP-72 (adult, infant, age 1, age 5, age 10, and age 15). Based on an evaluation of the CSFs and DCFs conducted over the range of age groups, future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. This evaluation is presented in Appendix F, Attachment F-1.

Tables VII-3A and VII-3B present the updated 2014 radiological CSFs and DCFs, respectively, for the radiological COCs, in comparison with the corresponding CSFs and DCFs that have been

previously used by the USACE in post-remedial risk and dose calculations in PDIR-FSSE reports and PRAR-FSSE reports through March 2015. The COCs presented represent parent radionuclides, and past RESRAD risk and dose calculations have always included CSFs and DCFs for progenies due to ingrowth throughout the 1,000-year period evaluated as part of the PDIR-FSSE reports and PRAR-FSSE reports. This methodology will continue to be applied when using the updated CSFs and DCFs in future risk and dose calculations conducted using RESRAD Version 7.0.

In both Tables VII-3A and VII-3B, gray-shaded cells indicate those updated 2014 CSFs and DCFs that are greater (i.e., more health-conservative) than the corresponding older values (i.e., 2001 HEAST CSFs and FGR-11 and FGR-12 DCFs). Those cells that are not shaded gray indicate the updated CSFs and DCFs are either equal to or less than the corresponding older values. The tables also present the percent change (i.e., increase or decrease) in CSFs and DCFs when comparing the updated 2014 values with the corresponding older values, with the positive percentages indicating the CSF and DCF values have increased over the older values as a result of the updates and the negative percentages indicating the values have decreased with the updates. A zero (0) is presented as the percent change if the 2014 updates resulted in no increase or decrease to the CSF s and DCFs.

Table VII-3A shows the changes in CSFs from the previously used 2001 HEAST values to the updated 2014 USEPA values. The soil ingestion CSFs decreased for all radiological COCs. Most of the food ingestion CSFs remained unchanged, with the values for two COCs (Ra-228 and U-235) showing a slight decrease as a result of the 2014 updates. However, increases in inhalation and external exposure CSFs occurred for a number of COCs. For inhalation, the 2014 updates resulted in CSF increases for the following COCs: Pa-231, Pb-210, Ra-226, Ra-228, Th-230, U-234, U-235, and U-238. The percent increases ranged from a minimum of 20 percent (Th-230) to a maximum of 744 percent (Ra-228). Because inhalation is not a significant pathway contributor of cancer risk at the Latty Avenue Properties, the increased CSFs would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the Latty Avenue Properties in terms of changing health protectiveness. However, the use of the new inhalation CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in slight CSF increases for the following COCs: Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. The percent increases ranged from a minimum of 0.4 percent (U-234) to a maximum of 148 percent (U-238). Previously, a 2001 HEAST CSF of 0 risk/year per pCi/g was indicated for Ra-228. This has been updated by the USEPA to 3.43E-11 risk/year per pCi/g (USEPA 2014b) based on the CSF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in ICRP-107. External exposure is a significant pathway contributor of cancer risk at the Latty Avenue Properties, mainly because post-remedial risk evaluations are conducted assuming no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure CSFs are primarily slight in magnitude, the increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the Latty Avenue Properties, in terms of health protectiveness determinations. However, the use of the new external exposure CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-3B shows the changes in DCFs from the previously used FGR-11 and FGR-12 values to the updated *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) values. The ingestion DCFs, which are applicable to both soil and food ingestion, decreased for all radiological COCs, with the exception of Ra-228 and Th-230, which increased by 79 percent and 45 percent, respectively. Because most of the DCFs for the radiological COCs decreased as a result of the 2014 updates, the increased DCFs for Ra-228 and Th-230 would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for the Latty Avenue Properties, in terms of health protectiveness determinations. However, the use of the new ingestion DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For inhalation, the 2014 updates resulted in DCF increases for the following COCs: Pb-210, Ra-226, Ra-228, and Th-230. The percent increases ranged from a minimum of 15 percent (Th-230) to a maximum of 1,145 percent (Ra-228). Because inhalation is not a significant pathway contributor of dose at the Latty Avenue Properties, the increased DCFs would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for the Latty Avenue Properties in terms of changing health protectiveness. However, the use of the new inhalation DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in a 66 percent increase in the DCF for U-238. Previously, a FGR-11 and FGR-12 DCF of 0 mrem/yr per pCi/g was indicated for Ra-228. This has been updated by *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) to 6.58E-05 mrem/yr per pCi/g based on the DCF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in ICRP-107. External exposure is a significant pathway contributor of dose at the Latty Avenue Properties, mainly because post-remedial risk evaluations are conducted assuming that no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure DCFs for Ra-228 and U-238 would be offset by the decreases in DCFs for the other COCs, the Ra-228 and U-238 DCF increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the Latty Avenue Properties, in terms of health protectiveness determinations. However, use of the new external exposure DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Metal Contaminants of Concern

Since issuance of the NC ROD, changes have been made to carcinogenic and noncarcinogenic toxicity factors for metal COCs used in the NC FS (USACE 2003a). Both the NC FS factors used for deriving the NC ROD RGs for metal COCs and the corresponding updated factors are presented in Tables VII-11A, VII-11B, and VII-11C for carcinogenic, subchronic noncarcinogenic, and chronic noncarcinogenic toxicities, respectively. Carcinogenic and noncarcinogenic toxicity criteria used for deriving metal RGs in soil are presented in Appendix D, Attachment 11, of the NC FS. Noncarcinogenic reference doses used in the NC FS included both chronic and subchronic values, depending on the receptor. For the Latty Avenue Properties, toxicity criteria were evaluated in this five-year review for all metal COCs in surface

soil/sediment (antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium) and subsurface soil (antimony, arsenic, thallium, and uranium). The purpose of the evaluations was to determine the validity of each toxicity factor relative to maintaining the health protectiveness of the remedy.

The NC FS toxicity factor is considered to be valid one of two ways: (1) no updates have been made to the toxicity factor since issuance of the NC ROD, or (2) the NC FS toxicity factor is more health conservative than the corresponding update considered appropriate for the North St. Louis County Sites. A toxicity factor used in the NC FS is considered outdated if the corresponding update is more health conservative. However, a determination of an outdated toxicity factor is not necessarily indicative of a recommendation that the factor, and consequently the RG, should be updated. Rather, the determination of at least one outdated factor triggers a post-remedial risk evaluation in this five-year review that incorporates all current (including updated) toxicity values to determine the overall health protectiveness of the remedy. The risk evaluations conducted for the Latty Avenue Properties are discussed in the subsection titled "Health Protectiveness of the Remedy."

The following paragraphs briefly describe the toxicity factor updates presented in Tables VII-11A, VII-11B, and VII-11C, as well as the expected impacts of the individual updates on health protectiveness of the remedy. Along with the numerical toxicity factors, Tables VII-11A, VII-11B, and VII-11C present the sources of the updated factors (i.e., the document[s] in which the factors were developed) and the tiers associated with the sources of the updated factors relative to the USEPA hierarchy of toxicological sources (USEPA 2003). This information is included in the footnotes to the tables.

Antimony

RfD_d values are calculated as the product of the RfD_o and the GIABS. The value used for both the chronic RfD_d and subchronic RfD_d has changed from 8.00E-06 to 6.00E-05 mg/kg-day as a result of an in increase the GIABS from 0.02 to 0.15. The increase in the RfD_d would result in a lower HI, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD_d for evaluating both subchronic and chronic dermal exposures is still valid with no impact to the health protectiveness of the remedy.

In addition to the change in the RfD_d, which affects evaluation of the dermal exposure route for antimony, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to RAGS Part E, there is no ABS value for antimony; therefore, under current guidance, antimony is not evaluated for dermal exposures. Continued use of the NC FS ABS for antimony in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to antimony. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Arsenic

For carcinogenic evaluations, the CSF_d for arsenic has decreased from the NC FS value of 3.66 to 1.50 $(mg/kg\text{-}day)^{-1}$. The CSF_d is calculated by dividing the CSF_o by the GIABS. The CSF_d for arsenic has decreased as a result of a change in the GIABS values from 0.41 to 1.0, resulting in a lower CR, if the CSF_d were to be used in risk calculations. Because the CSF_d has changed to a less conservative value, use of the NC FS CSF_d is still valid, and the health protectiveness of the remedy is not impacted.

RfD_d values are calculated as the product of the RfD_o and the GIABS. The RfD_d used for both chronic and subchronic evaluations during the NC FS has changed from 1.23E-04 to 3.00E-04 mg/kg-day as a result of an increase in the GIABS value from 0.41 to 1.0. The slight increase in the RfD_d would result in a reduction of the HI by a factor of approximately 2.4, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD for evaluating both subchronic and chronic dermal exposures is still valid, and the health protectiveness of the remedy is not impacted.

In addition to changes in the CSF_d and RfD_d values that affect evaluation of the dermal exposure route for arsenic, the dermal ABS of 0.001 previously used for arsenic in the NC FS (USACE 2003a) has been replaced with the higher value 0.03, per the RAGS Part E (USEPA 2004). Incorporation of the updated ABS value into risk calculations would increase the HI by a factor of 30-fold. The use of the new ABS in a risk assessment would result in a more health-conservative estimate of risk for arsenic; therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

During development of the NC FS, no subchronic or chronic inhalation toxicity factor (i.e., RfD_i or RfC) was available for arsenic. Currently, a Tier 3 inhalation RfC of 0.000015 mg/m^3 is available through the CALEPA (CALEPA 2015). The use of the new chronic RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for arsenic; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Barium

For noncarcinogenic evaluations of chronic and subchronic exposures, the RfD_o for barium has increased from the NC FS value of 0.07 to 0.20 mg/kg-day. Although the subchronic and chronic exposures are represented by the same RfD_o, the RfD_o is considered to be a Tier 3 value for subchronic exposures (ATSDR 2007), and a Tier 1 value for chronic exposures (NTP 1994). The increase in the RfD_o would result in a decreased HI if the updated value were to be used in risk calculations. Because the RfD_o has changed to a less stringent value, use of the NC FS RfD_o is still valid, and the health protectiveness of the remedy is not impacted.

Noncarcinogenic RfD_d values are calculated as the product of the RfD_o and the GIABS. The RfD_d used for both chronic and subchronic evaluations of barium during the NC FS has changed from 0.0049 to 0.014 mg/kg-day as a result of the increase in the RfD_o. The increase in the RfD_d would result in a reduction of the HI by a factor of approximately 2.8, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD_d for evaluating both subchronic and chronic dermal exposures is still valid, and the health protectiveness of the remedy is not impacted.

In addition to the change in the RfD_d, which affects evaluation of the dermal exposure route for barium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to RAGS Part E, there is no ABS value for barium; therefore, under current guidance, barium is not evaluated for dermal exposures. Continued use of the NC FS ABS for barium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to barium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Cadmium

For noncarcinogenic evaluations, the subchronic RfD_o for cadmium used in the NC FS has been reduced from 0.001 mg/kg-day to 0.0005 mg/kg-day. The chronic RfD_o has remained unchanged. By itself, the reduction in the subchronic RfD_o would result in an increased HI, by a factor of 2, if the updated value were to be used in risk calculations; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

During the NC FS, no subchronic RfD_d was applied in the risk calculations, though a value could have been calculated. Table VII-11 shows that a subchronic RfD_d of 0.0000125 mg/kg-day has been calculated for cadmium by multiplying the updated subchronic RfD_o by the GIABS. Application of this value in a risk assessment would increase the subchronic HI for the exposure route; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For chronic exposures, the RfD_d for cadmium has been increased from the NC FS value of 0.00001 to 0.000025 mg/kg-day. This change was the result of the GIABS changing from 0.01 to 0.025. Application of the updated chronic RfD_d to a risk calculation would result in a lower HI; therefore, because the RfD_d was changed to a less stringent value, use of the NC FS value is still considered to be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the RfD_d values that affect evaluation of the dermal exposure route for cadmium, the dermal ABS value of 0.01 previously used in the NC FS has been reduced by a factor of 10 to 0.001, per the RAGS Part E (USEPA 2004). Application of the updated chronic dermal ABS to a risk calculation would result in a lower HI for the exposure route. Because the ABS for cadmium was changed to a less stringent value, use of the NC FS value is still considered to be valid, and the health protectiveness of the remedy is not impacted.

Finally, the inhalation RfC for cadmium was updated by the ATSDR (ATSDR 2012b) from 0.0002 mg/m^3 to the Tier 3 value of 0.00001 mg/m^3. The use of the new RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for cadmium; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Molybdenum

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0019 mg/kg-day) has been updated to 0.005 mg/kg-day. The increase in the RfD_d value is a result of an increase in the GIABS from 0.38 (used in the NC FS) to 1.0. Use of the updated RfD_d in a dermal risk assessment of molybdenum would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for molybdenum, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, no ABS value exists for molybdenum; therefore, under current guidance, molybdenum is not evaluated for dermal exposures. Continued use of the NC FS ABS for molybdenum in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to molybdenum. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Nickel

The NC FS applied toxicity criteria for nickel based on the assumption that nickel is present at the Latty Avenue Properties as soluble salts. This is especially true for the inhalation criteria, because the alternative criteria for refinery dusts are not applicable to contamination being addressed at the Latty Avenue Properties. Table VII-11 shows that during development of the NC FS, no carcinogenic or noncarcinogenic criteria for inhalation were available for nickel as soluble salts; however, the following are now available: a Tier 3 carcinogenic IUR of 0.00026 (micrograms per cubic meter [$\mu g/m^3$])$^{-1}$ (CALEPA 2015) a Tier 3 subchronic RfC of 0.0002 mg/m^3 (ATSDR 2005); and a Tier 3 chronic RfC of 0.00009 mg/m^3 (ATSDR 2005). Use of these values in an inhalation risk assessment is more health protective than performing no evaluations at all, as was the case in the NC FS; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0054 mg/kg-day) has been updated to 0.0.00084 mg/kg-day. The decrease in the RfD_d value is a result of a corresponding decrease in the GIABS from 0.27 (used in the NC FS) to 0.04. Use of the updated RfD_d in a dermal risk assessment of nickel would result in increased HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for nickel, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for nickel; therefore, under current guidance, nickel is not evaluated for dermal exposures. Continued use of the NC FS ABS for nickel in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to nickel. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Selenium

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0022 mg/kg-day) has been updated to 0.005 mg/kg-day. The increase in the RfD_d value is a result of an increase in the GIABS from 0.44 (used in the NC FS) to 1.0. Use of the updated RfD_d in a dermal risk assessment of selenium would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for selenium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for selenium; therefore, under current guidance, selenium is not evaluated for dermal exposures. Continued use of the NC FS ABS for selenium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to selenium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

During development of the NC FS, no subchronic or chronic inhalation toxicity factor (i.e., RfD_i or RfC) was available for selenium. Currently, a Tier 3 chronic inhalation RfC of 0.02 mg/m^3 (CALEPA 2015) is available. The use of the new chronic RfC in a risk assessment would result in a

slightly more health-conservative estimate of risk for selenium; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Thallium

During the NC FS, thallium was evaluated as thallium sulfate; therefore, for consistency, thallium toxicity updates are evaluated in this five-year review for thallium sulfate. Table VII-11 shows that the subchronic and chronic RfD_o values used in the NC FS (0.0008 mg/kg-day and 0.00008 mg/kg-day, respectively) have been reduced to more stringent values, with the subchronic RfD_o now 0.00005 mg/kg-day and the chronic RfD_o 0.00002 mg/kg-day. These values were obtained from the online Risk Assessment Information System (RAIS) (ORNL 2015) and are Provisional Peer-Reviewed Toxicity Values (PPRTVs). Currently, there are no toxicity criteria for thallium (and related compounds) on the online Integrated Risk Information System (IRIS) database (USEPA 2015b), which, according to the *Human Health Toxicity Values in Superfund Risk Assessments* (USEPA 2003), is the primary source of toxicity information (i.e., Tier 1) in the source hierarchy. The USEPA considers the PPRTV database as a secondary source of toxicity information (i.e., Tier 2) in the source hierarchy (USEPA 2003). All values (RfDs and RfCs) previously on the IRIS database were withdrawn due to low confidence in the studies from which they were derived. Application of the updated subchronic RfD_o and the updated chronic RfDo in a risk assessment would result in higher total HIs than those that would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the values used for the subchronic RfD_d and the chronic dermal RfD_d in the NC FS for thallium (0.0008 mg/kg-day and 0.00008 mg/kg-day, respectively) have been updated to the more stringent values of 0.00005 mg/kg-day and 0.00002 mg/kg-day, respectively. The changes in both RfD_d values are a result of changes in the corresponding RfD_o values (as discussed previously), as well as in the GIABS values, the latter of which increased from 0.2 (used in the NC FS) to 1.0. Use of the updated subchronic RfD_d and the updated chronic RfD_d in a risk assessment would result in higher total HIs than those that would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

In addition to changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for thallium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, no ABS value exists for thallium; therefore, under current guidance, thallium is not evaluated for dermal exposures. Continued use of the NC FS ABS for thallium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to thallium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Vanadium

Table VII-11 shows that a RfD_o of 0.007 mg/kg was used to evaluate subchronic and chronic exposures to vanadium (as "vanadium and compounds") in the NC FS. This RfD_o has been withdrawn from the IRIS database. Currently, an RfD_o has (0.00504 mg/kg-day) been established for subchronic and chronic exposures to "vanadium and compounds" that is used by the USEPA for evaluating both chronic and subchronic exposures to vanadium. The Tier 1 RfD_o, which is presented in the USEPA IRIS database (Stokinger et al. 1953), is a surrogate value calculated from the corresponding chronic RfD_o for vanadium pentoxide by factoring out the

molecular weight of the oxide ion. Use of the updated RfD in evaluating subchronic and chronic ingestion exposures in a risk assessment would result in higher pathway and total HIs than would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.00007 mg/kg-day) has been updated to 0.000131 mg/kg-day. The increase in the RfD_d values is a result of the change in in the RfD_o (discussed previously) and an increase in the GIABS from 0.01 (used in the NC FS) to 0.026. Use of the updated RfD_d in a dermal risk assessment of vanadium would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for vanadium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, no ABS value exists for vanadium; therefore, under current guidance, vanadium is not evaluated for dermal exposures. Continued use of the NC FS ABS for vanadium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to vanadium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Changes in Risk Assessment Methods

There have been no changes in radiological risk assessment methods since the Second Five-Year Review Report (USACE 2010a) that would impact the protectiveness of the remedy, because post-remedial action risk assessments use the most recent versions of risk assessment guidance and models.

For metal COCs at the Latty Avenue Properties, there has been one change in standardized risk assessment methods for evaluating exposures since completion of the Second Five-Year Review Report. This change occurred with the publication of the RAGS Part F to address human health risk related to inhalation exposures. The previously established RAGS Part A methodology determines chemical intake that is dependent on the inhalation rate and body weight (USEPA 1989). However, the RAGS Part A methodology is no longer consistent with the current USEPA Inhalation Dosimetry Methodology (per the RAGS Part F). This is because it has been determined that the amount of chemical reaching the target site is not a simple function of the inhalation rate and body weight. Instead the interaction between the inhaled contaminant and the respiratory tract is affected by factors such as species-specific relationships of exposure concentrations to deposited/delivered doses and physiochemical characteristics of the inhaled contaminant. The target site where the toxic effect occurs is also considered when applying dosimetric adjustments to experimental concentrations. The RAGS Part F provides a methodology for incorporating concentration-based toxicity criteria (i.e., RfCs for noncarcinogenic effects and inhalation IURs for carcinogenic endpoints) into inhalation risk calculations (USEPA 2009a). The RfCs and IURs now supersede the previously used inhalation RfDs and CSFs, respectively, that were based on intake. Using equations presented in the RAGS Part F, calculations were performed to convert current RfCs and IURs to the equivalent RfD and CSF values, and vice versa. For the sake of conducting comparative evaluations to determine the validity of toxicity criteria used in the NC FS versus current values, both sets of inhalation toxicity criteria are presented in Table VII-10. Because the inhalation exposure pathway is a minor contributor to the overall risk to industrial and residential receptors evaluated

at the Latty Avenue Properties, this change in inhalation risk assessment methodology does not impact the health protectiveness of the remedy. This is further demonstrated by the risk evaluations discussed in the "Health Protectiveness of the Remedy" section.

In summary, the changes in inhalation risk assessment methods, as presented in the RAGS Part F, do not impact the health protectiveness of the remedy being implemented at the Latty Avenue Properties. This recent guidance update, which applies only to the metal COCs at the Latty Avenue Properties, has been incorporated into risk evaluations in this five-year review, the results of which are discussed in the next section (i.e., "Health Protectiveness of the Remedy").

Health Protectiveness of the Remedy

Radiological Contaminants of Concern

As previously discussed, based on an evaluation of the CSFs and DCFs conducted over the range of age groups (see Appendix F, Attachment F-1), future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. Additionally, the evaluation indicates no substantial difference in risk between using the 2001 HEAST and FGR-13 CSFs and the DCFPAK 3.02 (adult) CSFs (i.e., 2014 USEPA PRG CSFs based on ICRP-107) for St Louis FUSRAP receptors. Similarly, the evaluation in Appendix F, Attachment F-1, shows no difference in dose results between the FGR-11 and FGR-12 DCFs and the DCFPAK 3.02 (adult) DCFs. Therefore, application of the updated DCFPAK 3.02 (adult) CSFs and DCFs in future St. Louis FUSRAP residual risk and dose assessments will not likely result in a property meeting the criteria for unrestricted (i.e., per the NC ROD) when, in fact, it does not meet the NC ROD criteria for UUUE based on calculations using the previous CSFs (i.e., from the 2001 HEAST) and DCFs (i.e., from FGR-11 and FGR-12).

Another concern arising from the use of the DCFPAK 3.02 (adult) CSFs and DCFs is the impacts on the health protectiveness of accessible soil areas at North St. Louis County Sites properties that have already met the criteria for UUUE. Of particular concern are those properties associated with the most elevated resident gardener risks, as determined in the PDIR-FSSE reports and PRAR-FSSE reports. Therefore, a second evaluation has been conducted for a property (VP-53) representing the most elevated risk and dose estimated during a PRAR-FSSE assessment. This evaluation for VP-53 (see Appendix F, Attachment F-4), applied all of the same EPCs, exposure assumptions, and RESRAD model inputs used in the PRAR-FSSE report, with the exceptions that RESRAD Version 7.0, along with the updated DCFPAK 3.02 (adult) CSFs and DCFs, have been used in this evaluation. Table VII-12 shows no significant differences between the PRAR-FSSE report risk and dose results and those obtained in this five-year review evaluation using the DCFPAK 3.02 (adult) CSFs and DCFs.

In summary, based on the evaluation of VP-53 as being associated with the most elevated risk and dose estimated in a PRAR-FSSE report, the remedy being implemented at the North St. Louis County Sites to address MED/AEC-related radiological contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Metal Contaminants of Concern

As part of this five-year review, all of the updated exposure assumptions and toxicity data, as well as the updated inhalation risk methodologies (i.e., per the RAGS Part F), have been collectively incorporated into human health risk calculations for the previously listed Latty Avenue Properties to determine the overall impact of the updates to the continued

protectiveness of the remedy for industrial land use (see Appendix F, Attachment F-5). Because no changes have been made to the exposure and toxicity data used in radiological assessments, the remedy being implemented at the Latty Avenue Properties to meet radiological RGs is still considered to be health protective, based on the findings of the Second Five-Year Review Report (USACE 2010a). Consequently, the risk calculations in this five-year review have been conducted for the metal COCs only. The use of the updated factors in this five-year review is not a recommendation for updating the risk-based RGs established in the NC ROD. Rather, the risk evaluations are a means to demonstrate that remediation to meet the NC ROD RGs results in residual concentrations that continue to be health protective in light of the most recent exposure and toxicity data available, and that the exposure assumptions and toxicity factors used to derive the RGs are still valid.

Response actions have been completed at the following Latty Avenue Properties: the HISS and Futura, VP-01(L) and Parcel 10K530087, and VPs 02(L), 03(L), 04(L), and 05(L). Of these properties, post-remedial datasets and risk evaluations have been finalized for metals in soil at the following properties, as documented in the respective PRAR-FSSE reports:

- HISS,
- Parcel 10K530087,
- VP-02(L), and
- Futura.

Risk evaluations for other properties for which implementation of the remedy to address metals is ongoing but not yet final as of this writing will be included in future five-year reviews as needed.

The metals risk evaluations of the HISS, Parcel 10K530087, VP-02(L), and Futura properties were conducted using the following receptor scenarios:

- industrial worker,
- construction worker,
- utility worker,
- road worker,
- maintenance worker,
- recreational user/trespasser (ages 6 to 14 years old), and
- resident.

Of the previously listed receptors, RGs were developed in the NC FS and established in the NC ROD for the protection of construction workers and residents. Similar to the NC FS, the resident is a composite young child/adult who lives at one residence for an assumed duration of time. In the NC FS, this duration was a total of 30 years (i.e., 6 years as a young child and 24 years as an adult); however, based on the latest USEPA standard default factors, the total duration of time lived at one residence assumed in this five-year review is 26 years (i.e., 6 years as a young child and 20 years as an adult) (USEPA 2014a). Exposures and risks to the composite resident are calculated by applying age-weighted average intake rates for ingestion and dermal contact for a young child and an adult; therefore, this receptor is referred to as the "age-weighted resident." The remaining receptor scenarios were evaluated in a manner consistent with the pathways utilized in Appendix D, Attachment 11, of the NC FS, as well as subsequent PRAR-FSSE reports that have been prepared since the NC ROD. However, the metals risk evaluations in this five-year review include all updated exposure factors (as presented in Table VII-10 and discussed in the previous section titled "Changes in Exposure Assumptions") and toxicity criteria (as presented in Table VII-11 and discussed in the previous section titled "Changes in Toxicity or Contaminant Characteristics.")

All remedial actions have been completed at the HISS, Parcel 10K530087, VP-02(L), and Futura under the authority of the NC ROD; therefore, final metals datasets are available for the risk evaluations of these properties in this five-year review. The final datasets include the latest investigation and post-remedial verifications results, the latter of which is comprised of residual soil concentrations that remain in areas where remediation was performed to meet the risk-based RGs. The final datasets were used to compute EPCs to facilitate the risk evaluations.

Both noncancer HIs and CRs were calculated to assess exposures to metal COCs at the individual Latty Avenue Properties (the HISS, Parcel 10K530087, VP-02[L], and Futura), which are summarized in Tables VII-13 through VII-16. In addition to evaluating the individual properties, EPCs, HIs, and CRs were calculated for all Latty Avenue Properties combined into a property group. The HIs and CRs for the combined Latty Avenue Properties are presented in Table VII-17. For each property, as well as the combined property group, cumulative CRs (i.e., total CRs summed over all carcinogenic COCs and exposure pathways) were compared to the USEPA acceptable range of $1x10^{-6}$ to $1x10^{-4}$. Cumulative HIs (i.e., total HIs summed over all noncarcinogenic COCs affecting similar target organs and over all exposure pathways) were also calculated for each property, as well as the combined property group, and compared to the USEPA target HI value of 1. CRs and target organ HIs calculated to be less than the target values ($1x10^{-4}$ and 1, respectively) indicate that the current remedy to meet the NC ROD RGs is health protective under the evaluated property/receptor scenarios.

Tables VII-13 through VII-17 indicate that all cumulative target organ HIs for the HISS and all CRs estimated for all individual and combined Latty Avenue Properties are less than the USEPA target HI and risk values of 1 and $1x10^{-4}$, respectively. The following list summarizes properties that exhibit HI exceedances of the target value of 1, as well as the reasons for the exceedances:

- Parcel 10K530087 (Table VII-14):
    - Surface Soil – The skin HI exceeds the target value of 1 due to thallium and arsenic. Individual surface soil HIs for thallium (0.91) and arsenic (0.35) are each less than 1; however, the thallium HI is being driven only by the presence of an elevated detection limit reported for location/sample SVP103877. This non-detect thallium result is qualified as estimated due to matrix issues. Without the elevated detection limit, the cumulative skin HI becomes less than the target value of 1.
- VP-02(L) (Table VII-15):
    - Surface Soil – The skin and central nervous system (CNS) HIs exceed 1 due to thallium; however, all surface soil results for thallium at VP-02(L) are non-detects.
    - Subsurface Soil – The skin and CNS HIs exceed 1 due to thallium. Fifteen (15) out of 16 subsurface soil results for thallium are non-detects, with the CNS HI being driven by elevated detection limits reported for the following nine locations/samples: SVP123469, SVP124602, SVP127229, SVP124518, SVP127649, SVP127722, SVP128625, SVP126528, and SVP129006.
- Futura (Table VII-16):
    - Subsurface Soil – The skin HI slightly exceeds 1 (HI = 1.1) due to thallium and arsenic. Individual HIs for thallium (0.87) and arsenic (0.14) are each less than 1, with thallium being the predominant contributor. However, 9 out of 11 sample results for thallium are non-detects, with the skin HI being driven by an elevated detection limit at location/sample SVP125643.

- Combined Latty Avenue Properties (Table VII-17):
    - Subsurface Soil – The skin HI exceeds the target of 1 due to thallium and arsenic. Individual HIs for thallium (0.99) and arsenic (0.35) are each less than 1, with thallium being the predominant contributor to the total HI. However, the thallium HI is being driven by elevated detection limits at Parcel 10K530087 and VP-02(L), as discussed previously for each of these properties.

Although some slightly elevated HIs have been calculated for metals in soil at three properties, these HIs are driven by non-detect thallium results. Therefore, the risk evaluations of metal COCs in soil at the HISS, Parcel 10K530087, VP-02(L), and Futura properties confirm in this five-year review that the NC ROD remedy is health protective relative to metal COCs at the Latty Avenue Properties.

In summary, the remedy being implemented at the Latty Avenue Properties to address MED/AEC-related metals contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Remediation Goals

RGs were established in the NC ROD for radiological COCs in soil based on the authority provided by 40 *CFR* 192, Subpart B; and 10 *CFR* 40, Appendix A, Criterion 6(6). PRAR-FSSE reports for properties that have been remediated to meet those RGs have demonstrated the health protectiveness of the remedy. Because there have been no changes to these regulations since the Second Five-Year Review Report (USACE 2010a), the existing radiological RGs are still valid.

Due to changes in exposure factors, toxicity factors, and the standardized methodology for evaluating inhalation relative to metals risk assessments, risk evaluations were performed in this five-year review using post-remediation concentrations of metal COCs measured in soil at the HISS, VP-01(L) and Parcel 10K530087, and VP-02(L). The evaluations included updated exposure factors and toxicity values relative to those originally used to derive the risk-based RGs in the NC FS and NC ROD, as well as the implementation of the RAGS Part F methodology for evaluating inhalation. The results of the evaluations demonstrate that the residual soil concentrations of the metal COCs at the Latty Avenue Properties are still considered health protective following remediation to meet the NC ROD RGs, in light of updated exposure and toxicity factors and risk assessment methods. Therefore, the remedy is still considered to be health protective relative to metal COCs at the Latty Avenue Properties.

Expected Progress Toward Meeting Remedial Action Objectives

The following NC ROD (USACE 2005a) RAOs are identified for the North St. Louis County Sites:

1. Prevent exposure to contaminated soils at concentrations which exceed chemical-specific ARARs or which result in an excess lifetime cancer risk greater than the acceptable risk range (greater than one in ten thousand) or which result in a Hazard Index (HI) greater than 1. The potential exposure pathways are direct contact, ingestion, inhalation of dust, and external gamma.

2. Prevent exposure to contaminated structural surfaces at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. Buildings and structures are contaminated primarily as a result of contaminated soils adhering to or becoming embedded in surfaces. The potential exposure pathways are external gamma, ingestion, and inhalation.
3. Prevent exposure to contaminated sediments in Coldwater Creek at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. The potential exposure pathways are direct contact, ingestion, and external gamma.
4. Remove the potential for ongoing migration of soil contaminants to the shallow ground-water system (HZ-A) and Coldwater Creek. Accomplishing this objective would also preclude the potential for future impacts to the deep ground-water systems (HZ-C, HZ-D, and the usable ground-water resource HZ-E).

The RAOs are still considered valid and continue to guide remedial actions at the Latty Avenue Properties. As stated previously, excavation and off-site disposal of contaminated soil was performed as prescribed in the HISS EE/CA and Action Memorandum and the NC ROD. Completed activities have met the response action criteria.

Question C: Has any other information come to light that could call into question the protectiveness of the response?

Answer C: No, there have been no newly identified ecological risks, impacts from natural disasters, or other information that has come to light that could affect the protectiveness of the response action.

SLAPS AND SLAPS VPs

Question A: Is the response action functioning as intended by the decision documents?

Answer A: Yes, the response action is functioning as intended by the decision documents.

The NC ROD (USACE 2005a) states:

The main components of the selected remedy include:

- Excavate all accessible contaminated soils to remediation goals (RGs) that support unlimited use and unrestricted exposure (UUUE) and dispose off-site at a permitted facility;
- Impose use restrictions at areas under roads, active rail lines and other permanent structures where the residual condition is not consistent with UUUE;
- Dredge contaminated sediments from Coldwater Creek to RGs that support UUUE;
- Remove contaminated soils from the surfaces of buildings and structures as necessary to achieve RGs that support UUUE, or remove the contaminated structures themselves and dispose off-site at a permitted facility;
- Monitor ground water and surface water during the soil remediation period to ensure water quality is not adversely effected and identify any areas where ground water may be significantly degraded; and,

- Monitor ground water long-term in selected areas where soils contaminated above RGs are left in place or where contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

The main components of the removal action conducted at the SLAPS and Ballfields prior to NC ROD approval are described in the SLAPS EE/CA and Action Memorandum (USACE 1999a):

> Soils from the SLAPS and the Ballfields (excluding the north ditch) that exceed the selected criteria of 15/15/50 pCi/g (respectively for Ra-226/Th-230/U-238) above background (by SOR) would be excavated and disposed of at a licensed or permitted disposal facility. Soils within the top 6-inch [15-cm] layer that exceed the 5/5/50 pCi/g above background (by SOR) will be excavated.

Response Action Performance

Response actions have been completed at the SLAPS and several SLAPS VPs (such as VPs 05, 06, 08, 09, 10, 12, 24, 31A, 53, 54, 55, and 63, IA-12, IA-13, Frost Avenue ROW, McDonnell Boulevard East Section (b) ROW, and VP-16). Response actions have been conducted but are not yet complete at some SLAPS VPs, such as VPs 04(C), 05(C), 08(C), and 38, IA-09, IA-10, and CWC Area North of McDonnell Boulevard. The excavation and off-site disposal of contaminated soil at the SLAPS and SLAPS VPs is being performed as prescribed in the NC ROD (USACE 2005a). Response actions conducted at the SLAPS and SLAPS VPs prior to September 2005 were performed as prescribed in the SLAPS EE/CAs and Action Memoranda. Completed activities have met the RGs and have achieved the RAOs, as documented in the PRARs and FSSEs listed in Table VI-5.

Verification sampling (i.e., an FSS) was conducted for each excavated area at the SLAPS and SLAPS VPs. The results of the FSSs for the remediated properties are summarized in the tables in Appendix C. The FSS results and the risk and dose assessments demonstrate that the remediated areas satisfy the NC ROD RGs for UUUE.

The ground-water monitoring program at the SLAPS detected concentrations of total U in shallow ground water above the NC ROD monitoring guideline of 30 μg/L. Concentrations of total U detected in PW46 have averaged approximately 2,580 μg/L since it was installed at the western edge of the SLAPS in April 2006. Based on data for the monitoring well previously at this location, PW38, the concentrations of total U in shallow ground water have declined. The average concentration of total U detected in ground-water samples collected over the period March 2000 to November 2003 from PW38 was 7,900 μg/L. The March 2013 sampling results for PW46 (the last sampling event for PW46 that falls within this five-year review period) indicate that the concentration of total U in this well was 3,095 μg/L. However, because the total U concentrations in PW46 have exceeded the total U guideline, monitoring will continue subject to subsequent five-year reviews.

Elevated levels of chromium and, to a lesser extent, nickel, have been observed in some of the shallow ground-water wells at the SLAPS and SLAPS VPs. Based on the CWC sampling data, the concentrations of these metals in CWC surface water have not been impacted. Potential causes of the elevated concentrations include well corrosion, increased amounts of fine-grained sediments suspended in samples, the timing of nearby remediation activities, changes in geochemical conditions, or a combination of these and other factors. To provide additional data to assess the potential causes of the increasing trends, monitoring will continue subject to

subsequent five-year reviews. The sampling frequencies for the affected wells have been increased, and both filtered and unfiltered samples are being collected.

Systems Operations/Operations and Maintenance

Past and current system operations and O&M activities include annual well inspections and maintenance of access controls. `These activities are effective in maintaining the protectiveness of the remedy. No large variances in O&M costs are anticipated.

Opportunities for Optimization

Opportunities continue to exist for optimization of the environmental monitoring system. The sampling locations, frequencies, and target constituents will be modified on the basis of historical data, trends, and the progress of the remedial action. Further opportunities for optimization were not identified in this five-year review.

Early Indicators of Potential Issues

As discussed previously, the early indicators of potential issues include the presence of elevated levels of chromium, nickel, and total U in shallow ground water.

Implementation of Institutional Controls and Other Measures

COCs remaining at the site will be addressed under the selected remedy identified in the NC ROD. An Institutional Controls Implementation Plan is being developed to outline the institutional controls that will be established for the North St. Louis County Sites to ensure continued protection of human health and the environment following completion of the remedial action. Following completion of remediation activities and the delineation of the residual contamination remaining at an individual property, an evaluation will be conducted by the USACE to determine what additional institutional controls are required.

Prior to response activities at any property, the USACE obtains an access agreement with the property owner that allows for ROE. The USACE works with the property owners to ensure appropriate steps are taken to protect the property owners' employees, including meeting with the employees to keep them informed of the FUSRAP activities. Temporary fences, gates, and/or barriers are installed around the work zone, warning signs are posted at designated intervals, and specific points are established for ingress and egress. Anyone not involved in the response action is restricted from entry into the construction zone. As conditions change, controls are modified to restrict access.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of response selection still valid?

Answer B: Yes, the exposure assumptions, toxicity data, cleanup levels, and response action objectives used at the time of response selection are still valid, and any changes in these values have no impact on protectiveness.

Changes in Exposure Pathways

There have been no changes in land use, no change in the understanding of the physical site conditions, and no new COCs. There are no unanticipated toxic by-products from the remedy.

Changes in Exposure Assumptions

Since the Second Five-Year Review Report (USACE 2010a), the USEPA has published the 2011 Exposure Factors Handbook. Based on the information provided in the 2011 Exposure Factors Handbook, the USEPA more recently published updated standard exposure factor default values in OSWER Directive 9200.1-120 *(Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors)* (USEPA 2014a). A discussion of both guidance resources (USEPA 2011, 2014), along with the updated exposure factors contained therein, is provided in the previous section for the SLDS. Updates in exposure factors specific to the SLAPS and SLAPS VPs are discussed as follows, along with a statement for each existing exposure factor as to whether or not the factor is still considered valid. For the SLAPS and SLAPS VPs, an "existing" exposure factor is one that is presented in Table D.2 of the NC FS (USACE 2003a) and/or is currently used in post-remedial risk evaluations, and is a factor for which updates previously have not been made available by the USEPA. The determination of the current validity of an existing exposure factor is conducted in the same manner as previously discussed for the SLDS and Latty Avenue exposure factors. The determination of at least one outdated factor (i.e., a factor for which a more health-conservative value is currently recommended by the USEPA) triggers a post-remedial risk evaluation that incorporates all current (including updated) exposure values to determine the overall health protectiveness of the remedy. The risk evaluation is discussed in the subsection titled "Health Protectiveness of the Remedy."

Radiological dose and risk assessments for the SLAPS and SLAPS VPs have historically been conducted, and continue to be conducted under the NC ROD to demonstrate that NC ROD RGs (based on 40 *CFR* 192, Subparts B and C, and 10 *CFR* 40, Appendix A [Criterion 6(6)]) have been attained. All exposure factors and input values used for past and ongoing post-remedial RESRAD dose and risk calculations for the SLAPS and SLAPS VPs are presented in Table VII-9. Likewise, exposure factors used in the derivation of risk-based NC ROD RGs for metals are presented in Table VII-10. Both Tables VII-9 and VII-10 apply to the risk evaluations of all North St. Louis County Sites. Exposure factors are used for evaluations of the following receptor scenarios at the SLAPS and SLAPS VPs: industrial worker, construction worker, utility worker, road worker, maintenance worker, recreational user/trespasser (assumed to be ages 6 to 14 years old), resident child (ages 0 to 6 years old), resident adult (ages 7 and older), and the age-adjusted resident (assumes exposure is represented by an age-weighted average for an individual living at a property, as both a child and then an adult). To date, the USEPA has updated values for the following exposure factors:

- exposure duration for an adult living at one residence (reduced from 24 to 20 years),
- body weight for a recreational user/trespasser, ages 6 to 14 years (reduced from 50 to 44.3 kg),
- body weight for an adult (increased from 70 to 80 kg),
- body weight for a young child, ages 0 to 6 years (reduced to 15 kg),
- skin surface areas for all receptors (reduced for all receptors except for a recreational user/trespasser and a resident adult, which have increased [see Table VII-10]),
- soil-to-skin adherence factors for the industrial worker, maintenance worker, recreational user/trespasser, young child resident, adult resident, and age-adjusted resident (see Table VII-10), and

- PEFs for workers (decreased to the more conservative value of 1E+07 m^3/kg, which corresponds to the default inhalation mass loading factor used in the RESRAD model).
- PEFs for recreational users/trespassers and residents (increased to the current, less stringent USEPA standard default value of 1.36E+09 m^3/kg).

The updates in exposure duration for a resident adult, adult and young child body weights, adult and young child skin surface areas available for exposure, and soil-to-skin adherence factors (all presented above) affect the calculations of the following age-adjusted intake rates for a composite child/adult residential receptor that are used in the evaluations for residential CRs at the Latty Avenue Properties:

- age-adjusted soil ingestion rate and
- age-adjusted dermal factor for soil.

Tables VII-9 and VII-10 show that all of these exposure factor updates, with the exception of the exposure duration for an adult resident, are applicable to risk calculations for metal exposures only and do not impact radiological dose and risk calculations. In radiological risk evaluations, the exposure duration for adult residents shown in Table VII-9 results in an increase in the age-adjusted soil ingestion rate and soil ingestion risk and dose. However, the reduced exposure duration results in a reduction in risk and dose estimated for the external radiation exposure route. Because external radiation is the predominant radiological pathway at the Latty Avenue Properties, the net result of the decreased exposure duration for an adult resident is a slight decrease in risk and dose from those that would be estimated using the NC FS value. Otherwise, none of the radiological exposure factors and RESRAD input values have changed since the Second Five-Year Review Report.

For metals, Table VII -10 presents footnote(s) for each updated factor that cite the source(s) of the factor, and also provides information relevant to the updates in the "Comments" column. Table VII-10 shows that of the previously listed factor updates, the following factors would result in less risk during a risk calculation and are therefore less health conservative than those in the NC FS (USACE 2003a):

- body weight for the adult,
- exposure duration for the adult resident,
- skin surface areas for all workers and the resident child,
- soil-to-skin adherence factors for the recreational user/trespasser and resident adult, and
- PEF for the recreational user/trespasser and residents.

Use of the remaining factor updates in Table VII-10 (i.e., in gray-shaded cells) in a risk assessment would result in higher risks than those that would be estimated using the NC FS exposure factors. Because many of the updated exposure factors are more health conservative than those used in the NC FS, all of the most current exposure factors have been incorporated into evaluating risks due to exposures to post-remedial metals concentrations in soil at the following three properties: the SLAPS, IA-13, and IA-11. These properties were evaluated because (1) soil samples were collected and analyzed for metals, and (2) the PRAR-FSSE reports and PDIR-FSSE reports (applicable to IA-11), including the metals datasets presented therein, have been finalized. The results of the risk evaluations are discussed in the section titled "Health Protectiveness of the Remedy."

Changes in Toxicity or Contaminant Characteristics

No changes have occurred in the characteristics of the radiological and metal COCs identified for the SLAPS and SLAPS VPs; however, since finalization of the Second Five-Year Review Report (USACE 2010a) for the FUSRAP SLS, both radiological and metal toxicity factors have been updated, as discussed in the following sections.

Radiological Contaminants of Concern

Post-remediation residual radionuclide risk and dose assessments are conducted on individual properties/areas associated with the NC ROD (USACE 2005a). Post-remedial risk and dose estimates summarized in the NC ROD were calculated using RESRAD Version 5.82 using FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs. For the SLAPS and SLAPS VPs radiological COCs, the 2001 HEAST CSFs resulted in a slightly more conservative remedial risk than those for 1997 HEAST values. The 2001 HEAST CSFs were based on those presented in FGR-13 (USEPA 1999). The PDIR-FSSE reports and PRAR-FSSE report residual risk and dose assessments conducted for the SLAPS and SLAPS VPs were conducted using the most current version of RESRAD at the time, as well as the FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs.

In late 2014, the USEPA updated the CSFs associated with the online, web-based PRG calculator. The new CSFs were calculated by ORNL using DCAL software in the manner of FGR-12 and FGR-13 for internal intakes and for external exposure, respectively, and were based on ICRP-107. ICRP-107 contains a revised database of nuclear decay data (energies and intensities of emitted radiations, physical half-lives, and decay models) for 1,252 naturally occurring and manmade radionuclides and supersedes the previous database, ICRP-38 published in 1983.

In 2014, RESRAD Version 7.0 was released. RESRAD Version 7.0 extended its DCF database and software capability to include the new DCFs and CSFs associated with the USEPA PRG calculator. RESRAD Version 7.0 allows the user to select from 14 different DCF and CSF libraries: DCFPAK 3.02 (adult, infant, age 1, age 5, age 10, and age 15); DOE STD-1126-2001 (reference person); FGR-11 (FGR-13 or 2001 HEAST CSFs); and ICRP-72 (adult, infant, age 1, age 5, age 10, and age 15). Based on an evaluation of the CSFs and DCFs conducted over the range of age groups, future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. This evaluation is presented in Appendix F, Attachment F-1, of this Third Five-Year Review Report.

Tables VII-3A and VII-3B present the updated 2014 radiological CSFs and DCFs, respectively, for the radiological COCs, in comparison with the corresponding CSFs and DCFs previously used by the USACE in post-remedial risk and dose calculations in PDIR-FSSE reports and PRAR-FSSE reports through March 2015. The COCs presented represent parent radionuclides, and past RESRAD risk and dose calculations have always included CSFs and DCFs for progenies due to ingrowth throughout the 1,000-year period evaluated as part of the PDIR-FSSE reports and PRAR-FSSE reports. This methodology will continue to be applied when using the updated CSFs and DCFs in future risk and dose calculations conducted using RESRAD Version 7.0.

In both Tables VII-3A and VII-3B, gray-shaded cells indicate those updated 2014 CSFs and DCFs greater (i.e., more health-conservative) than the corresponding older values (i.e., 2001 HEAST CSFs and FGR-11 and FGR-12 DCFs). Those cells that are not shaded gray indicate the updated CSFs and DCFs are either equal to or less than the corresponding older values. The tables also present the percent change (i.e., increase or decrease) in CSFs and DCFs

when comparing the updated 2014 values with the corresponding older values, with the positive percentages indicating the CSF and DCF values have increased over the older values as a result of the updates and the negative percentages indicating the values have decreased with the updates. A zero (0) is presented as the percent change if the 2014 updates resulted in no increase or decrease to the CSF s and DCFs.

Table VII-3A shows the changes in CSFs from the previously used 2001 HEAST values to the updated 2014 USEPA values. The soil ingestion CSFs decreased for all radiological COCs. Most of the food ingestion CSFs remained unchanged with the values for two COCs (Ra-228 and U-235) showing a slight decrease as a result of the 2014 updates. However, increases in inhalation and external exposure CSFs occurred for a number of COCs. For inhalation, the 2014 updates resulted in CSF increases for the following COCs: Pa-231, Pb-210, Ra-226, Ra-228, Th-230, U-234, U-235, and U-238. The percent increases ranged from a minimum of 20 percent (Th-230) to a maximum of 744 percent (Ra-228). Because inhalation is not a significant pathway contributor of cancer risk at the SLAPS and SLAPS VPs, the increased CSFs would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the SLAPS and SLAPS VPs in terms of changing health protectiveness. However, the use of the new inhalation CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in slight CSF increases for the following COCs: Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. The percent increases ranged from a minimum of 0.4 percent (U-234) to a maximum of 148 percent (U-238). Previously, a 2001 HEAST CSF of 0 risk/year per pCi/g was indicated for Ra-228. This has been updated by the USEPA to 3.43E-11 risk/year per pCi/g (USEPA 2014b) based on the CSF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in ICRP-107. External exposure is a significant pathway contributor of cancer risk at the SLAPS and SLAPS VPs, mainly because post-remedial risk evaluations are conducted assuming no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure CSFs are primarily slight in magnitude, the increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the SLAPS and SLAPS VPs, in terms of health protectiveness determinations. However, the use of the new external exposure CSFs in a risk assessment could potentially result in a slightly more health-conservative estimate of total radiological risk for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-3B shows the changes in DCFs from the previously used FGR-11 and FGR-12 values to the updated *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) values. The ingestion DCFs, which are applicable to both soil and food ingestion, decreased for all radiological COCs, with the exception of Ra-228 and Th-230, which increased by 79 percent and 45 percent, respectively. Because most of the DCFs for the radiological COCs decreased as a result of the 2014 updates, the increased DCFs for Ra-228 and Th-230 would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for the SLAPS and SLAPS VPs, in terms of health protectiveness determinations. However, the use of the new ingestion DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For inhalation, the 2014 updates resulted in DCF increases for the following COCs: Pb-210, Ra-226, Ra-228, and Th-230. The percent increases ranged from a minimum of 15 percent (Th-230) to a maximum of 1,145 percent (Ra-228). Because inhalation is not a significant pathway contributor of dose at the SLAPS and SLAPS VPs, the increased DCFs would be unlikely to change the outcomes of past post-remedial dose evaluations conducted for the SLAPS and SLAPS VPs in terms of changing health protectiveness. However, the use of the new inhalation DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

For the external exposure pathway, the 2014 updates resulted in a 66 percent increase in the DCF for U-238. Previously, a FGR-11 and FGR-12 DCF of 0 mrem/yr per pCi/g was indicated for Ra-228. This has been updated by *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) to 6.58E-05 mrem/yr per pCi/g based on the DCF calculations of *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014) using the updated nuclear decay database in ICRP-107. External exposure is a significant pathway contributor of dose at the SLAPS and SLAPS VPs, mainly because post-remedial risk evaluations are conducted assuming no ground cover exists between the contaminated soil and the receptor. Because the increases in external exposure DCFs for Ra-228 and U-238 would be offset by the decreases in DCFs for the other COCs, the Ra-228 and U-238 DCF increases would be unlikely to change the outcomes of past post-remedial risk evaluations conducted for the SLAPS and SLAPS VPs, in terms of health protectiveness determinations. However, use of the new external exposure DCFs in a dose assessment could potentially result in a slightly more health-conservative estimate of total radiological dose for each property; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Metal Contaminants of Concern

Since issuance of the NC ROD, there have been changes to carcinogenic and noncarcinogenic toxicity factors for metal COCs used in the NC FS. Both the NC FS factors that were used for deriving the NC ROD RGs for metal COCs and the corresponding updated factors are presented in Tables VII-11A, VII-11B, and VII-11C for carcinogenic, subchronic noncarcinogenic, and chronic noncarcinogenic toxicities, respectively. Carcinogenic and noncarcinogenic toxicity criteria used for deriving metal RGs in soil are presented in Appendix D, Attachment 11, of the NC FS. Noncarcinogenic reference doses used in the NC FS included both chronic and subchronic values, depending on the receptor. For the SLAPS and SLAPS VPs, toxicity criteria were evaluated in this five-year review for all metal COCs in surface soil/sediment (antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium) and subsurface soil (antimony, arsenic, thallium, and uranium). The purpose of the evaluations was to determine the validity of each toxicity factor relative to maintaining the health protectiveness of the remedy.

The NC FS toxicity factor is considered to be valid in one of two ways: (1) there have been no updates to the toxicity factor since issuance of the NC ROD, or (2) the NC FS toxicity factor is more health conservative than the corresponding update considered appropriate for the North St. Louis County Sites. A toxicity factor used in the NC FS is considered outdated if the corresponding update is more health conservative. However, a determination of an outdated toxicity factor is not necessarily indicative of a recommendation that the factor, and consequently the RG, should be updated. Rather, the determination of at least one outdated factor triggers a post-remedial risk evaluation in this five-year review that incorporates all current (including

updated) toxicity values to determine the overall health protectiveness of the remedy. Risk evaluations were conducted for the SLAPS, IA-13, and IA-11 using updated metals toxicity criteria, the results of which are discussed in the subsection titled "Health Protectiveness of the Remedy."

The following paragraphs briefly describe the toxicity factor updates presented in Tables VII-11A, VII-11B, and VII-11C, as well as the expected impacts of the individual updates on health protectiveness of the remedy. Along with the numerical toxicity factors, Tables VII-11A, VII-11B, and VII-11C present the sources of the updated factors (i.e., the document[s] in which the factors were developed) and the tiers associated with the sources of the updated factors relative to the USEPA hierarchy of toxicological sources (USEPA 2003). This information is included in the footnotes to the tables.

Antimony

RfD_d values are calculated as the product of the RfD_o and the GIABS. The value used for both the chronic RfD_d and subchronic RfD_d has changed from 8.00E-06 to 6.00E-05 mg/kg-day as a result of an increase in the GIABS from 0.02 to 0.15. The increase in the RfD_d would result in a lower HI, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD_d for evaluating both subchronic and chronic dermal exposures is still valid, and the health protectiveness of the remedy is not impacted.

In addition to the change in the RfD_d, which affects evaluation of the dermal exposure route for antimony, the dermal ABS of 0.001 previously used in the NC FS (USACE 2003a) is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for antimony; therefore, under current guidance, antimony is not evaluated for dermal exposures. Continued use of the NC FS ABS for antimony in risk calculations is considered to be a more health protective methodology than not evaluating dermal exposures to antimony. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Arsenic

For carcinogenic evaluations, the CSF_d for arsenic has decreased from the NC FS value of 3.66 to 1.50 $(mg/kg\text{-}day)^{-1}$. The CSF_d is calculated by dividing the CSF_o by the GIABS. The CSF_d for arsenic has decreased as a result of a change in the GIABS from 0.41 to 1.0, resulting in a lower CR, if the CSF_d were to be used in risk calculations. Because the CSF_d has changed to a less conservative value, use of the NC FS CSF_d is still valid, and the health protectiveness of the remedy is not impacted.

RfD_d values are calculated as the product of the RfD_o and the GIABS. The RfD_d used for both chronic and subchronic evaluations during the NC FS has changed from 1.23E-04 to 3.00E-04 mg/kg-day as a result of an increase in the GIABS value from 0.41 to 1.0. The slight increase in the RfD_d would result in a reduction of the HI by a factor of approximately 2.4, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD for evaluating both subchronic and chronic dermal exposures is still valid, and the health protectiveness of the remedy is not impacted.

In addition to changes in the CSF_d and RfD_d values that affect evaluation of the dermal exposure route for arsenic, the dermal ABS of 0.001 previously used for arsenic in the NC FS (USACE 2003a) has been replaced with the higher value 0.03, per the RAGS Part E

(USEPA 2004). Incorporation of the updated ABS value into risk calculations would increase the HI by a factor of 30-fold. The use of the new ABS in a risk assessment would result in a more health conservative estimate of risk for arsenic; therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

During development of the NC FS, no subchronic or chronic inhalation toxicity factor (i.e., RfD_i or RfC) was available for arsenic. Currently, a Tier 3 inhalation RfC of 0.000015 mg/m^3 is available through the CALEPA (CALEPA 2015). The use of the new chronic RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for arsenic; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Barium

For noncarcinogenic evaluations of chronic and subchronic exposures, the RfD_o for barium has increased from the NC FS value of 0.07 to 0.20 mg/kg-day. Although the subchronic and chronic exposures are represented by the same RfD_o, the RfD_o is considered to be a Tier 3 value for subchronic exposures (ATSDR 2007) and a Tier 1 value for chronic exposures (NTP 1994). The increase in the RfD_o would result in a decreased HI if the updated value were to be used in risk calculations. Because the RfD_o has changed to a less stringent value, use of the NC FS RfD_o is still valid, and the health protectiveness of the remedy is not impacted.

Noncarcinogenic RfD_d values are calculated as the product of the RfD_o and the GIABS. The RfD_d used for both chronic and subchronic evaluations of barium in the NC FS has changed from 0.0049 to 0.014 mg/kg-day as a result of the increase in the RfD_o. The increase in the RfD_d would result in a reduction of the HI by a factor of approximately 2.8, if the RfD_d were to be used in risk assessment calculations. Because the RfD_d has changed to a less stringent value, use of the NC FS RfD_d for evaluating both subchronic and chronic dermal exposures is still valid, and the health protectiveness of the remedy is not impacted.

In addition to the change in the RfD_d, which affects evaluation of the dermal exposure route for barium, the dermal ABS of 0.001 previously used in the NC FS (USACE 2003a) is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for barium; therefore, under current guidance, barium is not evaluated for dermal exposures. Continued use of the NC FS ABS for barium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to barium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Cadmium

For noncarcinogenic evaluations, the subchronic RfD_o for cadmium used in the NC FS has been reduced from 0.001 to 0.0005 mg/kg-day. The chronic RfD_o has remained unchanged. By itself, the reduction in the subchronic RfD_o would result in an increased HI by a factor of 2 if the updated value were to be used in risk calculations; therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

During the NC FS, no subchronic RfD_d was applied in the risk calculations, though a value could have been calculated. Table VII-11 shows that a subchronic RfD_d of 0.0000125 mg/kg-day has been calculated for cadmium by multiplying the updated subchronic RfD_o by the GIABS. Application of this value in a risk assessment would increase the subchronic HI for the exposure route; therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

For chronic exposures, the RfD_d for cadmium has increased from the NC FS value of 0.00001 to 0.000025 mg/kg-day. This change is the result of the GIABS changing from 0.01 to 0.025. Application of the updated chronic RfD_d to a risk calculation would result in a lower HI; therefore, because the RfD_d was changed to a less stringent value, use of the NC FS value is still considered to be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the RfD_d values that affect evaluation of the dermal exposure route for cadmium, the dermal ABS value of 0.01 that was previously used in the NC FS (USACE 2003a) has been reduced by a factor of 10 to 0.001, per the RAGS Part E (USEPA 2004). Application of the updated chronic dermal ABS to a risk calculation would result in a lower HI for the exposure route. Because the ABS for cadmium was changed to a less stringent value, use of the NC FS value is still considered to be valid, and the health protectiveness of the remedy is not impacted.

Finally, the inhalation RfC for cadmium was updated by the ATSDR (ATSDR 2012b) from 0.0002 mg/m^3 to the Tier 3 value of 0.00001 mg/m^3. The use of the new RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for cadmium; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Chromium

In the NC FS, toxicity criteria for hexavalent chromium were used in the derivation of the soil RG for chromium, for increased health protection, even though hexavalent chromium was not identified as a COC at the SLAPS and SLAPS VPs. At the time of development of the NC FS, no CSF_o was available for hexavalent chromium; therefore, the ingestion route could not be evaluated for CR. Currently, no CSF_o exists for hexavalent chromium in the IRIS database, though Table VII-11 shows that a Tier 3 provisional value of 0.5 $(mg/kg\text{-}day)^{-1}$ derived by the New Jersey Department of Environmental Protection (NJDEP) (NJDEP 2009) has recently been adopted by the USEPA in the calculations of RSLs. Therefore, the NJDEP CSF_o is currently considered as being applicable to evaluating CR contributions from chromium at the SLAPS and SLAPS VPs. Incorporation of the updated CSF_o into a risk assessment would result in an increased total CR estimated for a receptor, in comparison to that which would result from not evaluating the ingestion route. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that no value was available for the CSF_d for hexavalent chromium during development of the NC FS, because no value was available for the CSF_o. The CSF_d is calculated by dividing the CSF_o by the GIABS. Application of the NJDEP (2009) CSF_o and the updated GIABS (0.025) results in a CSF_d of 20 $(mg/kg\text{-}day)^{-1}$ for hexavalent chromium. Incorporation of the updated CSF_d into a risk assessment would result in an increased total CR estimated for a receptor, in comparison to that which would result from not evaluating the dermal exposure route. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

The inhalation cancer slope factor (CSF_i) presented for chromium (assuming hexavalent chromium) in the NC ROD (USACE 2005a) (41 $[mg/kg\text{-}day]^{-1}$) converts to an IUR value (0.0117 $[\mu g/m^3]^{-1}$) slightly less health protective than the current Tier 1 value (0.012 $[\mu g/m^3]^{-1}$) (Mancuso 1975). During derivation of the outdated IUR, the USEPA had incorporated the assumption that total chromium consists of a 1:6 ratio of hexavalent to trivalent chromium. Because the current IUR is slightly more health protective than the IUR corresponding to the

CSF_i used in the NC FS, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the subchronic RfD_o for hexavalent chromium (0.02 mg/kg-day) used in the NC FS has been withdrawn by the USEPA. Currently, no update is available. Also, because subchronic RfD_d values are calculated as the product of the subchronic RfD_o and the GIABS, no subchronic RfD_d value is available. Use of the NC FS subchronic RfD_o and RfD_d in a risk assessment to evaluate the oral and dermal exposure routes is more health protective than performing no evaluations of the oral and dermal routes; therefore, the NC FS RfD_o and RfD_d values are considered to still be valid, and the health protectiveness of the remedy is not impacted.

The chronic RfD_d has been updated from the value used in the NC FS (0.00006 mg/kg-day) to 0.000075 mg/kg-day. The increased chronic RfD_d is a result of an increase in the GIABS value from 0.02 to 0.025. Incorporation of the updated chronic RfD_d into a risk assessment would result in a reduced HI versus the chronic RfD_d used in the NC FS.

In addition to the changes in the CSF_d, as well as changes in the subchronic and chronic RfD_d values, all of which affect the evaluation of the dermal exposure route for chromium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for chromium (assumed to be hexavalent chromium); therefore, under current guidance, chromium is not evaluated for dermal exposures. Continued use of the NC FS ABS for chromium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to chromium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Molybdenum

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0019 mg/kg-day) has been updated to 0.005 mg/kg-day. The increase in the RfD_d values is a result of an increase in the GIABS from 0.38 (used in the NC FS) to 1.0. Use of the updated RfD_d in a dermal risk assessment of molybdenum would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for molybdenum, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for molybdenum; therefore, under current guidance, molybdenum is not evaluated for dermal exposures. Continued use of the NC FS ABS for molybdenum in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to molybdenum. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Nickel

The NC FS applied toxicity criteria for nickel based on the assumption that nickel is present at the SLAPS and SLAPS VPs as soluble salts. This is especially true for the inhalation criteria, because the alternative criteria for refinery dusts are not applicable to contamination being addressed at the SLAPS and SLAPS VPs. Table VII-11 shows that during development of the NC FS, no carcinogenic or noncarcinogenic criteria for inhalation were available for nickel as

soluble salts; however, the following are now available: a Tier 3 carcinogenic IUR of 0.00026 $(\mu g/m^3)^{-1}$ (CALEPA 2015); a Tier 3 subchronic RfC of 0.0002 mg/m^3 (ATSDR 2005); and a Tier 3 chronic RfC of 0.00009 mg/m^3 (ATSDR 2005). Use of these values in an inhalation risk assessment is more health protective than performing no evaluations at all, as was the case in the NC FS; therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0054 mg/kg-day) has been updated to 0.0008 mg/kg-day. The decrease in the RfD_d values is a result of a corresponding decrease in the GIABS from 0.27 (used in the NC FS) to 0.04. Use of the updated RfD_d in a dermal risk assessment of nickel would result in increased HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for nickel, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for nickel; therefore, under current guidance, nickel is not evaluated for dermal exposures. Continued use of the NC FS ABS for nickel in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to nickel. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Selenium

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.0022 mg/kg-day) has been updated to 0.005 mg/kg-day. The increase in the RfD_d values is a result of an increase in the GIABS from 0.44 (used in the NC FS) to 1.0. Use of the updated RfD_d in a dermal risk assessment of selenium would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to the changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for selenium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for selenium; therefore, under current guidance, selenium is not evaluated for dermal exposures. Continued use of the NC FS ABS for selenium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to selenium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

During development of the NC FS, no subchronic or chronic inhalation toxicity factor (i.e., RfD_i or RfC) was available for selenium. Currently, a Tier 3 chronic inhalation RfC of 0.02 mg/m^3 (CALEPA 2015) is available. The use of the new chronic RfC in a risk assessment would result in a slightly more health-conservative estimate of risk for selenium; therefore, the overall protectiveness of the remedy has been evaluated as discussed in the "Health Protectiveness of the Remedy" section.

Thallium

During the NC FS, thallium was evaluated as thallium sulfate; therefore, for consistency, thallium toxicity updates are evaluated in this five-year review for thallium sulfate. Table VII-11 shows that the subchronic and chronic RfD_o values used in the NC FS (0.0008 mg/kg-day and 0.00008 mg/kg-day, respectively) have been reduced to more stringent values, with the subchronic RfD_o now 0.00005 mg/kg-day and the chronic RfD_o 0.00002 mg/kg-day. These values were obtained from the online RAIS (ORNL 2015) and are PPRTVs. Currently, there are no toxicity criteria for thallium (and related compounds) on the online IRIS database (USEPA 2015b), which, according to the *Human Health Toxicity Values in Superfund Risk Assessments* (USEPA 2003), is the primary source of toxicity information (i.e., Tier 1) in the source hierarchy. The USEPA considers the PPRTV database as a secondary source of toxicity information (i.e., Tier 2) in the source hierarchy (USEPA 2003). All values (RfDs and RfCs) previously on the IRIS database were withdrawn due to low confidence in the studies from which they were derived. Application of the updated subchronic RfD_o and the updated chronic RfD_o in a risk assessment would result in higher total HIs than those that would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section. Table VII-11 shows that the values used for the subchronic RfD_d and the chronic dermal RfD_d for thallium (0.0008 mg/kg-day and 0.00008 mg/kg-day, respectively) in the NC FS have been updated to the more stringent values of 0.00005 mg/kg-day and 0.00002 mg/kg-day, respectively. The changes in both RfD_d values are a result of changes in the corresponding RfD_o values (as discussed previously), as well as in the GIABS values, the latter of which increased from 0.2 (used in the NC FS) to 1.0. Use of the updated subchronic RfD_d and the updated chronic RfD_d in a risk assessment would result in higher total HIs than those that would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

In addition to changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for thallium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for thallium; therefore, under current guidance, thallium is not evaluated for dermal exposures. Continued use of the NC FS ABS for thallium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to thallium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Uranium

Table VII-11 shows that for noncarcinogenic evaluations, no subchronic RfD_o was available for use for evaluating uranium in the NC FS, and that a value of 0.003 mg/kg-day was used as the chronic RfD_o. Although there has been no change to the chronic RfD_o, a Tier 3 subchronic RfD_o of 0.0002 mg/kg-day (ATSDR 2013) is now available. The availability of a subchronic RfD_o and application into a risk assessment would result in an increased total HI over that which would be estimated without the RfD_o. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

For evaluating dermal exposures, Table VII-11 shows that no subchronic RfD_d was available for use for evaluating uranium in the NC FS, and that a value of 0.0025 mg/kg-day was used as the chronic RfD_d. Currently, a subchronic RfD_d of 0.0002 mg/kg-day is available based on the recent availability of the subchronic RfD_o and an updated GIABS, which was changed from the NC FS

value of 0.85 to a value of 1.0. If used in a risk assessment, the new subchronic RfD_d would result in a higher total HI than that which would be estimated without the RfD_d. Also, the chronic RfD_d has been updated to 0.003 mg/kg-day, based on the chronic RfD_o and updated GIABS values. Use of the updated chronic RfD_d would result in a lower HI than that which would be estimated using the NC FS value. The overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

In addition to changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for uranium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for uranium; therefore, under current guidance, uranium is not evaluated for dermal exposures. Continued use of the NC FS ABS for uranium in risk calculations is considered to be a more health-protective methodology than not evaluating dermal exposures to uranium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Regarding inhalation, Table VII-11 shows that no toxicity criteria (RfD_i or RfC values) were available for evaluating dust inhalation exposures to uranium. However, subchronic and chronic RfC values of 0.0001 mg/kg-day and 0.00004 mg/kg-day, respectively, are currently available for use in inhalation risk assessments. Both RfCs are Tier 3 toxicity values obtained from the ATSDR (ATSDR 2013). The use of the new RfCs in a risk assessment would result in more health-conservative estimates of risk for uranium as compared to risk estimates that exclude the inhalation route (per the NC FS). Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Vanadium

Table VII-11 shows that an RfD_o of 0.007 mg/kg was used to evaluate subchronic and chronic exposures to vanadium (as "vanadium and compounds") in the NC FS. This RfD_o has been withdrawn from the IRIS database. Currently, an RfD_o (0.00504 mg/kg-day) has been established for subchronic and chronic exposures to "vanadium and compounds" and is used by the USEPA for evaluating both chronic and subchronic exposures to vanadium. The Tier 1 RfD_o, which is presented in the USEPA IRIS database (Stokinger et al. 1953), is a surrogate value calculated from the corresponding chronic RfD_o for vanadium pentoxide by factoring out the molecular weight of the oxide ion. Use of the updated RfD in evaluating subchronic and chronic ingestion exposures in a risk assessment would result in higher pathway and total HIs than would be estimated using the NC FS values. Therefore, the overall protectiveness of the remedy has been evaluated, as discussed in the "Health Protectiveness of the Remedy" section.

Table VII-11 shows that the value used for both the subchronic RfD_d and the chronic dermal RfD_d in the NC FS (0.00007 mg/kg-day) has been updated to 0.000131 mg/kg-day. The increase in the RfD_d values is a result of the change in the RfD_o (discussed previously) and an increase in the GIABS from 0.01 (used in the NC FS) to 0.026. Use of the updated RfD_d in a dermal risk assessment of vanadium would result in reduced HI values versus those that would be calculated using the NC FS RfD_d. Therefore, the NC FS RfD_d is considered to still be valid, and the health protectiveness of the remedy is not impacted.

In addition to changes in the subchronic RfD_d, chronic RfD_d, and GIABS values that affect evaluation of the dermal exposure route for vanadium, the dermal ABS of 0.001 previously used in the NC FS is no longer applicable, per the RAGS Part E. According to the RAGS Part E, there is no ABS value for vanadium; therefore, under current guidance, vanadium is not evaluated for dermal exposures. Continued use of the NC FS ABS for vanadium in risk calculations is

considered to be a more health-protective methodology than not evaluating dermal exposures to vanadium. Therefore, the NC FS ABS value is considered to still be valid, and the health protectiveness of the remedy is not impacted.

Changes in Risk Assessment Methods

There have been no changes in radiological risk assessment methods since the Second Five-Year Review Report (USACE 2010a) that would impact the protectiveness of the remedy, because post-remedial action risk assessments use the most recent versions of risk assessment guidance and models.

For metals, there have been two changes in standardized risk assessment methods for evaluating exposures since completion of the Second Five-Year Review Report. The first change involves the establishment of assessing CRs assuming a mutagenic mode of action for hexavalent chromium via the evaluation of early life stage exposures, per the *Supplemental Guidance for Assessing Cancer Susceptibility from Early Life Exposures to Carcinogens* (USEPA 2005). The second change occurred with the publication of the RAGS Part F to address human health risks related to inhalation exposures (USEPA 2009a). Both of these changes and their impacts to the health protectiveness of the remedy are discussed in the following subsections.

Mutagenic Mode of Action for Carcinogenesis

Regarding the evaluation of CRs that occur via the mutagenic mode of action as described by the *Supplemental Guidance for Assessing Cancer Susceptibility from Early Life Exposures to Carcinogens* (USEPA 2005), the USEPA Office of Pesticide Programs (OPP) made a determination that hexavalent chromium has a mutagenic mode of action for carcinogenesis in all cells regardless of type, following administration via drinking water. The OPP recommended that Age-Dependent Adjustment Factors (ADAFs) be applied when assessing CRs from early-life exposure (<16 years of age). This determination was reviewed by the OPP's Cancer Assessment Review Committee and published in a peer review journal: *An Evaluation of the Mode of Action Framework for Mutagenic Carcinogens Case Study II: Chromium (VI)* (USEPA 2009b). This methodology is typically applied to the evaluations of receptor scenarios that involve potential early life stage exposures (e.g., a resident or a trespasser/recreational user). Incorporation of age-weighted averaging using the ADAFs tends to result in increased risks over those estimated using no age adjusting or even those estimated using simpler age adjusting over two age groups (i.e., a young child and adult), as established in earlier risk assessment guidance documents.

For the SLAPS and SLAPS VPs, chromium was evaluated in the NC FS using toxicity criteria available for hexavalent chromium, which is the most toxic (carcinogenic) form of chromium. Although hexavalent chromium was never identified as a soil COC at the SLAPS and SLAPS VPs, toxicity criteria for hexavalent chromium were applied because of a lack of available toxicity criteria for total chromium, and to introduce a higher degree of human health protection in risk evaluations to minimize the probability of underestimating risks due to total chromium. Additionally, current USEPA guidelines applicable to evaluating CRs that could occur via the mutagenic mode of action have been incorporated into the evaluation of chromium, as hexavalent chromium, in soil at the SLAPS and SLAPS VPs. However, hexavalent chromium has never been identified as a COC at the SLAPS and SLAPS VPs for the following reasons: (1) hexavalent chromium is not likely to have been associated with or produced as a by-product of past MED/AEC uranium-ore processes; and (2) based on environmental fate information presented by the ATSDR (ATSDR 2012a), organic matter in the soil/sediment is expected to

convert the soluble hexavalent form of chromium to the insoluble, less mobile, and less toxic trivalent form. Regarding the environmental fate of hexavalent chromium, reduction to the trivalent form would very likely have occurred over the decades since the original placement of the wastes at the SLAPS and SLAPS VPs, if it is conservatively assumed that hexavalent chromium was even a constituent of those wastes in the first place.

In summary, the evaluation of chromium under the assumption that all chromium at the SLAPS and SLAPS VPs is in the hexavalent form, while incorporating additional assumptions of mutagenicity, is expected to overestimate potential CRs to individuals exposed to soil at the SLAPS and SLAPS VPs. Therefore, the evaluations of residual chromium in this five-year review are conservative verifications of the continued health-protectiveness of the remedy.

Changes in Risk Assessment Guidance for Evaluation of Inhalation Exposures

The previously established RAGS Part A methodology determines chemical intake that is dependent on the inhalation rate and body weight (USEPA 1989). However, the RAGS Part A methodology is no longer consistent with the current USEPA Inhalation Dosimetry Methodology (per the RAGS Part F). This is because it has been determined that the amount of chemical reaching the target site is not a simple function of the inhalation rate and body weight. Instead the interaction between the inhaled contaminant and the respiratory tract is affected by factors such as species-specific relationships of exposure concentrations to deposited/delivered doses and physiochemical characteristics of the inhaled contaminant. The target site where the toxic effect occurs is also considered when applying dosimetric adjustments to experimental concentrations. The publication of the RAGS Part F provides a methodology for incorporating concentration-based toxicity criteria (i.e., RfCs for noncarcinogenic effects and inhalation IURs for carcinogenic endpoints) into inhalation risk calculations. The RfCs and IURs now supersede the previously used inhalation RfDs and CSFs, respectively, that were based on intake. Using equations presented in the RAGS Part F (USEPA 2009a), calculations were performed to convert current RfCs and IURs to the equivalent RfD and CSF values, and vice versa. For the sake of conducting comparative evaluations to determine the validity of toxicity criteria used in the NC FS versus current values, both sets of inhalation toxicity criteria are presented in Table VII-11. Because the inhalation exposure pathway is a minor contributor to the overall risk to industrial and residential receptors evaluated at the SLAPS and SLAPS VPs, this change in inhalation risk assessment methodology does not impact the health protectiveness of the remedy. This is further demonstrated by the risk evaluations discussed in the “Health Protectiveness of the Remedy” section.

Summary

In summary, recent changes to risk assessment methods pertaining to the evaluation of hexavalent chromium via the mutagenic mode of action (USEPA 2009a) are more health conservative than those used in the NC FS and could affect the health protection status of the remedy at the SLAPS and SLAPS VPs. Evaluation of the inhalation exposure route using the latest RAGS Part F methodology (USEPA 2009a) does not impact the health protectiveness of the remedy being implemented at the SLAPS and SLAPS VPs. These recent guidance updates, which apply only to the metal COCs at the SLAPS and SLAPS VPs, have been incorporated into risk evaluations in this five-year review, the results of which are discussed in the next section (i.e., “Health Protectiveness of the Remedy”).

Health Protectiveness of the Remedy

Radiological Contaminants of Concern

As previously discussed, based on an evaluation of the CSFs and DCFs conducted over the range of age groups (see Appendix F, Attachment F-1), future residual risk and dose assessments are recommended to be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs. Additionally, the evaluation indicates no substantial difference in risk between using the 2001 HEAST and FGR-13 CSFs and the DCFPAK 3.02 (adult) CSFs (i.e., 2014 USEPA PRG CSFs based on ICRP-107) for St Louis FUSRAP receptors. Similarly, the evaluation in Appendix F, Attachment F-1, shows no difference in dose results between the FGR-11 and FGR-12 DCFs and the DCFPAK 3.02 (adult) DCFs. Therefore, application of the updated DCFPAK 3.02 (adult) CSFs and DCFs in future St. Louis FUSRAP residual risk and dose assessments will not likely result in a property meeting the criteria for unrestricted (i.e., per the NC ROD) when, in fact, it does not meet the NC ROD criteria for UUUE based on calculations using the previous CSFs (i.e., from the 2001 HEAST) and DCFs (i.e., from FGR-11 and FGR-12).

Another concern arising from the use of the DCFPAK 3.02 (adult) CSFs and DCFs is the impacts on the health protectiveness of accessible soil areas at North St. Louis County Sites properties that already met the criteria for UUUE. Of particular concern are those properties associated with the most elevated resident gardener risks as determined in the PDIR-FSSE reports and PRAR-FSSE reports. Therefore, a second evaluation has been conducted for a North St. Louis County Sites property (VP-53) representing the most elevated risk and dose estimated during a PRAR-FSSE assessment. This evaluation, which is presented in Appendix F, Attachment F-4, for VP-53, applied all of the same EPCs, exposure assumptions, and RESRAD model inputs used in the PRAR-FSSE assessment, with the exceptions that RESRAD Version 7.0, along with the updated DCFPAK 3.02 (adult) CSFs and DCFs, have been used in this evaluation. Although VP-53 is included in the Latty Avenue Properties, VP-53 was selected for this evaluation as a representative property for all North St. Louis County Sites. Table VII-12 shows no significant differences between the PRAR-FSSE assessment risk and dose results and those obtained in this five-year review evaluation using the DCFPAK 3.02 (adult) CSFs and DCFs.

In summary, based on the evaluation of VP-53 as being associated with the most elevated risk and dose estimated in a PRAR-FSSE assessment, the remedy being implemented at the North St. Louis County Sites (including the SLAPS and SLAPS VPs) to address MED/AEC-related radiological contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Metal Contaminants of Concern

As part of this five-year review, all of the updated exposure assumptions and toxicity data, as well as the updated inhalation risk methodologies (per the RAGS Part F), have been collectively incorporated into human health risk calculations to determine the overall impact of the updates to the continued protectiveness of the remedy for industrial land use (see Appendix F, Attachment F-6). Because there have been no changes to the exposure and toxicity data used in radiological assessments, the remedy being implemented at the SLAPS and SLAPS VPs to meet radiological RGs is still considered to be health protective, based on the findings of the Second Five-Year Review Report (USACE 2010a). Consequently, the risk calculations in this five-year review have only been conducted for the metal COCs. It should be noted that the use of the updated factors in risk evaluations conducted as part of this five-year review is not a

recommendation for updating the risk-based RGs established in the NC ROD. Rather, the risk evaluations are means to demonstrate that remediation to meet the NC ROD RGs results in residual concentrations that continue to be health protective in light of the most recent exposure and toxicity data available, and that the exposure assumptions and toxicity factors used to derive the RGs are still valid.

Response actions have been completed at the SLAPS and several SLAPS VPs (such as VPs 05, 06, 08, 09, 10, 12, 24c, 31A, 53, 54, 55, and 63, IA-12, IA-13, and VP-16 and the Norfolk Southern/Eva Loadout Facility). Of these properties, post-remedial datasets and risk evaluations of metals in soil have been finalized for the SLAPS and IA-13, as documented in the respective PRAR-FSSE reports. Additionally, datasets and risk evaluations of metals in soil have been finalized for a PDIR-FSSE report that was completed for IA-11 (USACE 2014d). Therefore, the SLAPS, IA-13, and IA-11 were selected for risk evaluation of metals in this five-year review. Risk evaluations for other properties for which implementation of the remedy to address metals is ongoing but not yet final as of this writing will be included in future five-year reviews as needed.

The metals risk evaluations of the SLAPS, IA-13, and IA-11 were conducted using the following receptor scenarios:

- industrial worker,
- construction worker,
- utility worker,
- road worker,
- maintenance worker,
- recreational user/trespasser (ages 6 to 14 years old), and
- resident.

Of the previously listed receptors, RGs were developed in the NC FS and established in the NC ROD for the protection of construction workers and residents. Similar to the NC FS, the resident is a composite young child/adult who lives at one residence for an assumed duration of time. In the NC FS, this duration was a total of 30 years (i.e., 6 years as a young child and 24 years as an adult); however, based on the latest USEPA standard default factors, the total duration of time lived at one residence assumed in this five-year review is 26 years (i.e., 6 years as a young child and 20 years as an adult) (USEPA 2014a). Exposures and risks to the composite resident are calculated by applying age-weighted average intake rates for ingestion and dermal contact for a young child and an adult; therefore, this receptor is referred to as the "age-weighted resident." The remaining receptor scenarios were evaluated in a manner consistent with the pathways and assumptions utilized in Appendix D, Attachment 11, of the NC FS, as well as subsequent PRAR-FSSE reports that have been prepared since the NC ROD. However, the metals risk evaluations in this five-year review include all updated exposure factors (as presented in Table VII-10 and previously discussed in the section titled "Changes in Exposure Assumptions") and toxicity criteria (as presented in Table VII-11 and previously discussed in the section titled "Changes in Toxicity or Contaminant Characteristics").

All investigative and remedial actions have been completed at the SLAPS, IA-13, and IA-11 under the authority of the NC ROD; therefore, final datasets are available for the risk evaluations of these properties in this five-year review. The final datasets include the latest investigation and post-remedial verifications results, the latter of which is comprised of residual soil concentrations that remain in areas where remediation was performed to meet the risk-based RGs. The final datasets were used to compute EPCs to facilitate the risk evaluations.

For each property, cumulative CRs (i.e., total CRs summed over all carcinogenic COCs and exposure pathways) were calculated and compared to the USEPA acceptable range of $1x10^{-6}$ to $1x10^{-4}$. Also cumulative HIs (i.e., total HIs summed over all noncarcinogenic COCs affecting similar target organs and over all exposure pathways) were calculated for the each property and compared to the USEPA target HI value of 1. CRs and target organ HIs calculated be less than the target values ($1x10^{-4}$ and 1, respectively) indicate that the current remedy to meet the NC ROD RGs is health protective under the evaluated property/receptor scenarios.

Both noncancer HIs and CRs were calculated to assess exposures to metal COCs at the SLAPS, IA-13, and IA-11 and are summarized in Tables VII-18, VII-19, and VII-20, respectively. The tables show that all cumulative CRs and target organ HIs calculated for the SLAPS, IA-13, and IA-11 are less than the USEPA target values of $1x10^{-4}$ and 1, respectively.

The finding that all CRs and HIs are less than the USEPA acceptable risk criteria indicates that the remedy being implemented at the SLAPS and SLAPS VPs to address MED/AEC-related metals contamination is health protective.

In summary, the remedy being implemented at the SLAPS and SLAPS VPs to address MED/AEC-related metals contamination is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Remediation Goals

RGs were established in the NC ROD for radiological COCs in soil based on the authority provided by 40 *CFR* 192, Subpart B, and 10 *CFR* 40, Appendix A, Criterion 6(6). PRAR-FSSE reports for properties that have been remediated to meet those RGs have demonstrated the health protectiveness of the remedy. Because there have been no changes to these regulations since the Second Five-Year Review Report (USACE 2010a), the existing radiological RGs are still valid.

Due to changes in exposure factors, toxicity factors, and the standardized methodology for evaluating inhalation relative to metals risk assessments, risk evaluations were performed in this five-year review using post-remediation concentrations of metal COCs measured in soil at the SLAPS, IA-13, and IA-11. The evaluations included updated exposure factors and toxicity values relative to those originally used to derive the risk-based RGs in the NC FS and NC ROD, as well as the implementation of the USEPA guidance on evaluating carcinogenicity, via mutagenic MOA, using early life stage exposures (USEPA 2005), and the RAGS Part F methodology for evaluating inhalation (USEPA 2009a). The results of the evaluations demonstrate that the residual soil concentrations of the metal COCs at the SLAPS and SLAPS VPs are still considered health protective following remediation to meet the NC ROD RGs, in light of the updated exposure and toxicity factors and risk assessment methods. Therefore, the remedy is still considered to be health protective relative to metal COCs at the SLAPS and SLAPS VPs.

Expected Progress Toward Meeting Remedial Action Objectives

The NC ROD RAOs are still considered valid and continue to guide remedial actions at the SLAPS and SLAPS VPs. The excavation and off-site disposal of contaminated soil was/is being performed as prescribed in the SLAPS Interim Action EE/CA, the SLAPS EE/CA and Action Memorandum, and the NC ROD. Completed activities have met the removal criteria and the NC ROD RGs. However, the initial volume of soil to be excavated was underestimated and the remedy is progressing more slowly than anticipated.

Question C: Has any other information come to light that could call into question the protectiveness of the response?

Answer C: No, there have been no newly identified ecological risks, impacts from natural disasters, or other information that has come to light that could affect the protectiveness of the response action.

SECTION VII

TABLES

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Table VII-1. Radiological Exposure Factors and RESRAD Input Values for Industrial Land Use Scenarios at the SLDS

Parameter	Unit	RESRAD Default[a]	Receptor Scenarios		Reference/Comments
			Industrial	Utility	
Soil Concentrations/Transport					
Soil concentrations	pCi/g	NA	Site-Specific	Site-Specific	
Distribution coefficients	cm^3/g	Element-Specific/ RESRAD Default	RESRAD Default	RESRAD Default	Distribution Coefficients are based on each radionuclide and defined in RESRAD.
Time since placement of material	year	0	0	0	RESRAD Default
Ground-water concentration	pCi/L	0	0	0	RESRAD Default
Solubility limit	moles/L	0	0	0	RESRAD Default
Leach rate	L/year	0	0	0	RESRAD Default
Use plant/soil ratio (checked/not checked)		not checked	not checked	not checked	RESRAD Default
Contaminated Zone Parameters					
Area of contaminated zone	m^2	10,000	Site-Specific	Site-Specific	Site specific area
Thickness of contaminated zone	m	2	2	2	Based on vertical extent of contamination.
Length parallel to aquifer flow	m	100	not used	not used	Water migration in contaminated zone is typically not evaluated for SLDS industrial land use scenarios.
Cover/Hydrological Data					
Cover depth	m	0	0	0	RESRAD Default - No cover assume for accessible soil areas under the SLDS ROD.
Density of cover material	g/cm^3	1.5	not used	not used	No cover assumed for accessible soil areas under the SLDS ROD.
Cover depth erosion rate	m/year	0.001	not used	not used	No cover assumed for accessible soil areas under the SLDS ROD.
Density of contaminated zone	g/cm^3	1.5	1.28	1.28	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 17, Table 2.1 Soil Type "Clay Loam."
Contaminated zone erosion rate	m/year	0.001	0.00006	0.00006	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 84, 3rd paragraph last sentence.
Contaminated zone total porosity	unitless	0.4	0.42	0.42	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 24, Table 3.2 Material "Clay."
Contaminated zone field capacity	unitless	0.2	0.36	0.36	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 28, field = total (0.42) - effective (0.06), values from Table 3.2 for "Clay."
Contaminated zone hydraulic conductivity	m/year	10	3.048	3.048	SLDS FS (USACE 1998d) page 2-13, 1E-5 cm/second = 3.15 m/year.
Contaminated zone b parameter	unitless	5.3	10.4	10.4	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 83, Table 13.1 Texture "Sandy Clay" or "Silty Clay."
Humidity in air	g/m^3	8	not used	not used	
Evapotranspiration coefficient	unitless	0.5	0.5	0.5	RESRAD Default
Average annual wind speed	m/second	2	4.17	4.17	*Baseline Risk Assessment for Exposure to Contaminants at the St. Louis Site, St. Louis, Missouri* (DOE 1993b) - site-specific average annual wind speed.
Precipitation	m/year	1	0.92	0.92	*Baseline Risk Assessment for Exposure to Contaminants at the St. Louis Site, St. Louis, Missouri* (DOE 1993b) - site-specific average annual precipitation.
Irrigation	m/year	0.2	0	0	Assumes no irrigation in the SLDS urban area.
Irrigation mode	unitless	Overhead	Overhead	Overhead	RESRAD Default
Runoff coefficient	unitless	0.2	0.8	0.8	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 74, Table 10.1 Type of Area "Urban Environment. Built up area."
Watershed area for nearby stream or pond	m^2	1,000,000	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Accuracy for water/soil computations	unitless	0.001	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.

Table VII-1. Radiological Exposure Factors and RESRAD Input Values for Industrial Land Use Scenarios at the SLDS

Parameter	Unit	RESRAD Default[a]	Receptor Scenarios		Reference/Comments
			Industrial	Utility	
Saturated Zone Data					
Saturated zone density	g/cm^3	1.5	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone total porosity	unitless	0.4	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone effective porosity	unitless	0.2	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone field capacity	unitless	0.2	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone hydraulic conductivity	m/year	100	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone hydraulic gradient	unitless	0.02	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Saturated zone b parameter	unitless	5.3	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Water table drop rate	m/year	0.001	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Well pump intake depth (m below water table)	m	10	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Model: Nondispersion (ND) or Mass-Balance (MB)	unitless	ND	ND	ND	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Well pumping rate	m^3/year	250	not used	not used	Saturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated Zone Data					
Number of unsaturated zone strata #	unitless	1	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone thickness	m	4	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone density	g/cm^3	1.5	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone total porosity	unitless	0.4	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone effective porosity	unitless	0.2	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone field capacity	unitless	0.2	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone hydraulic conductivity	m/year	10	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Unsaturated zone b parameter	unitless	5.3	not used	not used	Water migration in unsaturated zone is typically not evaluated for SLDS industrial land use scenarios.
Occupancy Data					
Inhalation rate	m^3/year	8,400	10,550	10,550	Equivalent to 28.9 m^3/day used in the SLDS FS. The inhalation rate is currently used in RESRAD calculations, per the RAGS Part A (USEPA 1989), for determining radiological risk, unlike the evaluations of metals, for which RAGS Part A methodology has been replaced with the Inhalation Dosimetry Methodology, per the RAGS Part F (USEPA 2009a). Please see the comment for "Inhalation of Soil as Dust" in Table VII-2 for additional information.
Mass loading for inhalation	g/m^3	0.0001	0.0002	0.0002	Obtained from the SLDS FS (USACE 1998d).
Exposure duration	year	30	25	1	RAGS Part A (USEPA 1989), *Exposure Factors Handbook* (USEPA 1997b).
Indoor dust filtration factor	unitless	0.4	0.5	0.5	
External gamma shielding factor	unitless	0.7	0.7	0.7	RESRAD Default
Fraction of time spent indoors	unitless	0.5	0.1969	0	
Fraction of time spent outdoors (on site)	unitless	0.25	0.04566	0.0091	
Shape of the contaminated zone: Circular; Non-Circular	unitless	Circular	Circular	Circular	RESRAD Default. Plant 2 PRAR-FSSE report/DOE Assessments.

Table VII-1. Radiological Exposure Factors and RESRAD Input Values for Industrial Land Use Scenarios at the SLDS

Parameter	Unit	RESRAD Default[a]	Receptor Scenarios		Reference/Comments
			Industrial	Utility	
Ingestion Dietary Data					
Fruits, vegetables and grain consumption	kg/year	160	not used	not used	Not applicable to industrial land use scenarios.
Leafy vegetable consumption	kg/year	14	not used	not used	Not applicable to industrial land use scenarios.
Milk consumption	L/year	92	not used	not used	Not applicable to industrial land use scenarios.
Meat and poultry consumption	kg/year	63	not used	not used	Not applicable to industrial land use scenarios.
Fish consumption	kg/year	5.4	not used	not used	Not applicable to industrial land use scenarios.
Other seafood consumption	kg/year	0.9	not used	not used	Not applicable to industrial land use scenarios.
Soil ingestion rate	g/year	36.5	49.64	175.2	RAGS Part A (USEPA 1989), *Exposure Factors Handbook* (USEPA 1997b).
Drinking water intake	L/year	510	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of drinking water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of household water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of livestock water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of irrigation water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of aquatic food	unitless	0.5	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of plant food	unitless	-1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of meat	unitless	-1	not used	not used	Not applicable to industrial land use scenarios.
Contamination fraction of milk	unitless	-1	not used	not used	Not applicable to industrial land use scenarios.
Ingestion Non-Dietary Data					
Livestock fodder intake for meat	kg/day	68	not used	not used	Not applicable to industrial land use scenarios.
Livestock fodder intake for milk	kg/day	55	not used	not used	Not applicable to industrial land use scenarios.
Livestock water intake for meat	L/day	50	not used	not used	Not applicable to industrial land use scenarios.
Livestock water intake for milk	L/day	160	not used	not used	Not applicable to industrial land use scenarios.
Livestock soil intake	kg/day	0.5	not used	not used	Not applicable to industrial land use scenarios.
Mass loading for foliar deposition	g/m^3	0.0001	not used	not used	Not applicable to industrial land use scenarios.
Depth of soil mixing layer	m	0.15	0.15	0.15	Not applicable to industrial land use scenarios.
Depth of roots	m	0.9	not used	not used	Not applicable to industrial land use scenarios.
Drinking water fraction from ground water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Household water fraction from ground water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Livestock fraction from ground water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Irrigation fraction from ground water	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Plant Factors					
Wet weight crop yield for non-leafy vegetables	kg/m^2	0.7	not used	not used	Not applicable to industrial land use scenarios.
Wet weight crop yield for leafy vegetables	kg/m^2	1.5	not used	not used	Not applicable to industrial land use scenarios.
Wet weight crop yield for fodder	kg/m^2	1.1	not used	not used	Not applicable to industrial land use scenarios.
Growing season for non-leafy vegetables	years	0.017	not used	not used	Not applicable to industrial land use scenarios.
Growing season for leafy vegetables	years	0.25	not used	not used	Not applicable to industrial land use scenarios.
Growing season for fodder	years	0.08	not used	not used	Not applicable to industrial land use scenarios.
Translocation factor for non-leafy vegetables	unitless	0.1	not used	not used	Not applicable to industrial land use scenarios.
Translocation factor for leafy vegetables	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Translocation factor for fodder	unitless	1	not used	not used	Not applicable to industrial land use scenarios.
Weathering removal constant for vegetation	L/year	20	not used	not used	Not applicable to industrial land use scenarios.
Dry foliar interception fraction for non-leafy vegetables	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Dry foliar interception fraction for leafy vegetables	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Dry foliar interception fraction for fodder	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Wet foliar interception fraction for non-leafy vegetables	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Wet foliar interception fraction for leafy vegetables	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Wet foliar interception fraction for fodder	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.

Table VII-1. Radiological Exposure Factors and RESRAD Input Values for Industrial Land Use Scenarios at the SLDS

Parameter	Unit	RESRAD Default[a]	Receptor Scenarios		Reference/Comments
			Industrial	Utility	
Storage Times					
Storage time: fruits, non-leafy vegetables, and grain	days	14	not used	not used	Not applicable to industrial land use scenarios.
Storage time: leafy vegetables	days	1	not used	not used	Not applicable to industrial land use scenarios.
Storage time: milk	days	1	not used	not used	Not applicable to industrial land use scenarios.
Storage time: meat and poultry	days	20	not used	not used	Not applicable to industrial land use scenarios.
Storage time: fish	days	7	not used	not used	Not applicable to industrial land use scenarios.
Storage time: crustacea and mollusks	days	7	not used	not used	Not applicable to industrial land use scenarios.
Storage time: well water	days	1	not used	not used	Not applicable to industrial land use scenarios.
Storage time: surface water	days	1	not used	not used	Not applicable to industrial land use scenarios.
Storage time: livestock fodder	days	45	not used	not used	Not applicable to industrial land use scenarios.
Radon					
Cover total porosity	unitless	0.5	not used	not used	Not applicable to industrial land use scenarios.
Cover volumetric water content	unitless	0.05	not used	not used	Not applicable to industrial land use scenarios.
Cover radon diffusion coefficient	m^2/second	0.000002	not used	not used	Not applicable to industrial land use scenarios.
Building foundation thickness	m	0.15	not used	not used	Not applicable to industrial land use scenarios.
Building foundation density	g/cm^3	2.4	not used	not used	Not applicable to industrial land use scenarios.
Building foundation total porosity	unitless	0.1	not used	not used	Not applicable to industrial land use scenarios.
Building foundation volumetric water content	unitless	0.03	not used	not used	Not applicable to industrial land use scenarios.
Building foundation radon diffusion coefficient	m^2/second	0.0000003	not used	not used	Not applicable to industrial land use scenarios.
Contamination radon diffusion coefficient	m^2/second	0.000002	not used	not used	Not applicable to industrial land use scenarios.
Radon vertical dimension of mixing	m	2	not used	not used	Not applicable to industrial land use scenarios.
Building air exchange rate	L/hour	0.5	not used	not used	Not applicable to industrial land use scenarios.
Building height	m	2.5	not used	not used	Not applicable to industrial land use scenarios.
Building indoor area factor	unitless	0	not used	not used	Not applicable to industrial land use scenarios.
Foundation depth below ground surface	m	-1	not used	not used	Not applicable to industrial land use scenarios.
Rn-222 emanation coefficient	unitless	0.25	not used	not used	Not applicable to industrial land use scenarios.
Rn-220 emanation coefficient	unitless	0.15	not used	not used	Not applicable to industrial land use scenarios.
Pathways					
Pathway – external gamma	unitless	Active	Active	Active	Exposure route applicable to industrial scenario.
Pathway – inhalation (without radon)	unitless	Active	Active	Active	Exposure route applicable to industrial scenario.
Pathway – plant ingestion	unitless	Active	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.
Pathway – meat ingestion	unitless	Active	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.
Pathway – milk ingestion	unitless	Active	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.
Pathway – aquatic foods	unitless	Active	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.
Pathway – drinking water	unitless	Active	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.
Pathway – soil ingestion	unitless	Active	Active	Active	Exposure route applicable to industrial scenario.
Pathway – radon	unitless	Suppressed	Suppressed	Suppressed	Exposure route not applicable to industrial scenario.

[a] Gray shading indicates RESRAD default values are used. Non-shaded cells indicate values other RESRAD default values are used.

Notes:

cm^3/g - cubic centimeter(s) per gram, g/cm^3 - gram(s) per cubic centimeters, g/m^3 - gram(s) per cubic meters, L - liter(s)

Table VII-2. Soil Exposure Factor Updates for Metal Contaminants of Concern for Industrial Land Use Scenarios at the SLDS

Exposure Factor Category	Exposure Parameter	Exposure Parameter Description	Units	Input Values for Exposure Factors[a]		Comments
				Industrial/ Construction Worker[b]	Utility Worker	
General	AT_c	Averaging Time, Carcinogenic (Ingestion & Dermal Contact)	days	25,550	25,550	RAGS Part A (USEPA 1989) standard default value for average lifetime equal to 70 years x 365 days/year.
	AT_{nc}	Averaging Time, Noncarcinogenic (Ingestion & Dermal Contact)	days	9,125	365	Per RAGS Part A (USEPA 1989), AT_{nc} = ED (years) x 365 (days/year)
	BW	Body Weight	kg	70 (80)	70 (80)	Updated 2014 USEPA values
	EF	Outdoor Exposure Frequency	days/year	50	10	Industrial/construction worker and utility worker values are site-specific values obtained from the SLDS ROD (USACE 1998a).
	ED	Exposure Duration	years	25	1	The EDs for an industrial/construction worker and residential receptors are standard default values (USEPA 1989, 2014a). The one-year ED for the utility worker is a site-specific value.
Incidental Soil Ingestion	IR_s	Soil Ingestion Rate	mg/day	50	480	
	FI	Fraction of Soil Ingested from the Site	unitless	1	1	Assumes 100 percent of ingested soil came from the site.
	CF	Conversion Factor	mg/kg	1.00E-06	1.00E-06	Units conversion from kg soil to mg soil.
Dermal Contact with Soil	SA	Skin Surface Area Available for Exposure	cm^2	5,800 (3,470)	5,800 (3,470)	Updated values from *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a)
	AF	Soil-to-Skin Adherence Factor	mg/cm^2	0.12	0.3	The AF values used in the SLDS FS for the workers are unknown. The AF value obtained for the industrial/construction worker was obtained from *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a). The AF value presented for utility workers was obtained from the RAGS Part E (USEPA 2004).
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	Chemical-Specific	During the NC FS, the ABS value for all metals, except for cadmium, was 0.001. The NC FS value for cadmium was 0.01. Currently, only ABS values for arsenic (0.03) and cadmium (0.001) are available. There are currently no available ABS values for the other metal COCs. Therefore, the ABS values used in deriving metal RGs were not provided in the SLDS FS.
	CF	Conversion Factor	mg/kg	1.00E-06	1.00E-06	Units conversion from kg soil to mg soil.
Inhalation of Soil as Dust	IR_a	Air Inhalation Rate	m^3/day	28.9 (NA)	28.9 (NA)	Use of an inhalation rate (and body weight) to determine chemical intake via the inhalation exposure route in the SLDS FS was consistent with RAGS Part A methodology (USEPA 1989). However, the RAGS Part A methodology is no longer consistent with USEPA's current Inhalation Dosimetry Methodology (per the RAGS Part F [USEPA 2009a]). This is because it has been determined that the amount of chemical reaching the target site is not a simple function of the inhalation rate and body weight. Instead the interaction between the inhaled contaminant and the respiratory tract is affected by factors such as species-specific relationships of exposure concentrations to deposited/delivered doses and physiochemical characteristics of the inhaled contaminant. The target site where the toxic effect occurs is also considered when applying dosimetric adjustments to experimental concentrations. Therefore, a current value for the inhalation rate is NA.
	$AT_{c\text{-}inh}$	Averaging Time, Carcinogenic (Inhalation)	hours	613,200	613,200	$AT_{c\text{-}inh}$ = 70 years x 365 days/year x 24 hours/day (per the RAGS Part F [USEPA 2009a]).
	$AT_{nc\text{-}inh}$	Averaging Time, Noncarcinogenic (Inhalation)	hours	219,000	8,760	$AT_{nc\text{-}inh}$ = ED (years) x 365 days/year x 24 hours/day (per the RAGS Part F [USEPA 2009a]).
	PEF	Particulate Emission Factor	m^3/kg	5.00E+06	5.00E+06	The PEFs presented are converted from the mass loading factor for inhalation used in the RESRAD evaluations for radiological dose and risk to industrial workers/construction workers and utility workers (0.0002 g/m^3) at the SLDS. The SLDS FS applied the value of 0.0002 g/m^3 to the industrial/construction worker for RG development. The PEFs presented are more health conservative than the USEPA's current default values.

[a] Soil exposure factors are presented for industrial land use scenarios presented in the SLDS FS (USACE 1998d) and SLDS ROD (USACE 1998a). Exposure assumptions are presented in the SLDS FS for the industrial/construction worker and utility worker. Exposure factors from the SLDS FS, as well as updated factors, are presented in this table. Where applicable, values from current guidance appear in parentheses. Gray-shaded cell indicates that the SLDS FS exposure factor was updated to the current value, which is more health-conservative than the SLDS FS value. Unshaded shaded cell with value in parentheses indicates that the SLDS FS exposure factor was updated to the current value, which is less health-conservative than the SLDS FS value. Unshaded cell with no values in parentheses indicates that there has been no change in the SLDS FS exposure factor.

[b] Per the SLDS FS (USACE 1998d), the industrial/construction worker is an individual who works indoors 215 days per year and could be outside performing light construction work approximately 50 days per year. The utility worker is an individual who performs utility work that is assumed to result in a once-in-a-lifetime exposure lasting for 10 days.

Notes:
AF - adherence factor, ED - exposure duration, mg - milligram(s), NA - not applicable

Table VII-3A. 2001 HEAST Versus 2014 USEPA Morbidity Cancer Slope Factors for the Radiological Contaminants of Concern at the SLS

Isotope[a]	Previously Used 2001 HEAST CSFs[b]					2014 USEPA CSFs[c]					Percent Change (Increase/Decrease) from the 2001 HEAST to the 2014 USEPA CSFs[d]			
	Soil Ingestion (Risk/pCi)	Inhalation (Risk/pCi)[e]		External Exposure (Risk/year per pCi/g)	Food Ingestion (Risk/pCi)	Soil Ingestion (Risk/pCi)	Inhalation (Risk/pCi)[e]		External Exposure (Risk/year per pCi/g)	Food Ingestion (Risk/pCi)	Soil Ingestion (%)	Inhalation (%)	External Exposure (%)	Food Ingestion (%)
Ac-227	3.81E-10	1.49E-07	S	3.48E-10	2.45E-10	2.45E-10	1.50E-07	S	1.98E-10	2.45E-10	-36	0.67	-43	0.0
Pa-231	3.74E-10	4.55E-08	S	1.39E-07	2.26E-10	2.26E-10	7.62E-08	F	1.27E-07	2.26E-10	-40	67	-8.6	0.0
Pb-210	1.84E-09	2.77E-09	M	1.41E-09	1.18E-09	1.18E-09	1.59E-08	S	1.48E-09	1.18E-09	-36	474	5.0	0.0
Ra-226	7.29E-10	1.15E-08	M	2.29E-08	5.14E-10	5.14E-10	2.82E-08	S	2.50E-08	5.14E-10	-29	145	9.2	0.0
Ra-228	2.28E-09	5.18E-09	M	0.00E+00	1.43E-09	1.42E-09	4.37E-08	S	3.43E-11	1.42E-09	-38	744	NA	-0.70
Th-228	2.89E-10	1.32E-07	S	5.59E-09	1.48E-10	1.48E-10	1.32E-07	S	5.64E-09	1.48E-10	-49	0.0	0.89	0.0
Th-230	2.02E-10	2.85E-08	S	8.19E-10	1.19E-10	1.19E-10	3.41E-08	F	8.45E-10	1.19E-10	-41	20	3.2	0.0
Th-232	2.31E-10	4.33E-08	S	3.42E-10	1.33E-10	1.33E-10	4.33E-08	S	3.58E-10	1.33E-10	-42	0.0	4.7	0.0
U-234	1.58E-10	1.14E-08	M	2.52E-10	9.55E-11	9.55E-11	2.78E-08	S	2.53E-10	9.55E-11	-40	144	0.40	0.0
U-235	1.57E-10	1.01E-08	M	5.18E-07	9.44E-11	9.43E-11	2.50E-08	S	5.51E-07	9.43E-11	-40	148	6.4	-0.11
U-238	1.43E-10	9.32E-09	M	4.99E-11	8.66E-11	8.66E-11	2.36E-08	S	1.24E-10	8.66E-11	-39	153	148	0.0

[a] RESRAD Version 6.5 cancer risk evaluations of the isotopes shown were conducted during PDIR-FSSE reports and PRAR-FSSE reports and always included CSFs for progeny ingrowth throughout the 1,000-year period modeled.

[b] 2001 HEAST cancer slope factors have been used in connjunction with RESRAD Version 6.5 until March 2015 to calculate risks and post-remedial residual risks associated with soil/sediment at the SLS properties in FUSRAP PDIR-FSSE reports and PRAR-FSSE reports.

[c] The DCFPAK 3.02 (adult) CSF library in RESRAD Version 7.0 contains updated (November 2014) CSFs associated with USEPA's radiological PRG calculator (USEPA 2014a) (available online at: http://epa-prgs.ornl.gov/radionuclides/download.html). Calculations of these CSFs were presented in *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014), based on the ICRP-107 nuclear decay database. A gray-shaded cell indicates the value increased from the 2001 HEAST value. An unshaded cell indicates that the CSF either did not change or decreased relative to the 2001 HEAST value.

[d] A positive percent change means that the current 2014 USEPA CSF is greater than the corresponding 2001 HEAST value. A negative percent change means that the current 2014 USEPA CSF is less than the corresponding 2001 HEAST value. A zero (0) indicates that there has been no change in the 2014 USEPA CSF relative to the corresponding 2001 HEAST value.

[e] Inhalation classifications indicate the relative amount of time it takes for the inhaled contaminant to become absorbed into the bloodstream from the lung: F (Fast), M (Medium), and S (Slow).

Notes:

pCi - picocurie(s)

Table VII-3B. FGR-11 and FGR-12 Versus 2014 Updated Dose Conversion Factors for the Radiological Contaminants of Concern at the SLS

Isotope[a]	Previously Used FGR-11 and FGR-12 DCFs[b]				2014 Updated DCFs Presented in RESRAD Version 7.0 DCFPAK 3.02 Library (Adult)[c]				Percent Change (Increase/Decrease) from the FGR-11 and FGR-12 to the 2014 Updated DCFs[d]		
	Ingestion (mrem/pCi)	Inhalation (mrem/pCi)[e]		External Exposure (mrem/yr per pCi/g)	Ingestion (mrem/pCi)	Inhalation (mrem/pCi)[e]		External Exposure (mrem/yr per pCi/g)	Ingestion (%)	Inhalation (%)	External Exposure (%)
Ac-227	1.41E-02	6.70E+00	D	4.95E-04	1.19E-03	5.76E-01	F	2.62E-04	-92	-91	-47
Pa-231	1.06E-02	1.28E+00	W	1.91E-01	1.77E-03	8.51E-01	F	1.61E-01	-83	-34	-16
Pb-210	5.37E-03	1.36E-02	D	2.45E-03	2.58E-03	2.08E-02	S	2.09E-03	-52	53	-15
Ra-226	1.32E-03	8.58E-03	W	3.18E-02	1.04E-03	3.52E-02	S	3.18E-02	-21	310	0.0
Ra-228	1.44E-03	4.77E-03	W	0.00E+00	2.58E-03	5.94E-02	S	6.58E-05	79	1,145	NA
Th-228	3.96E-04	3.42E-01	Y	7.94E-03	2.66E-04	1.47E-01	S	7.25E-03	-33	-57	-8.7
Th-230	5.48E-04	3.26E-01	W	1.21E-03	7.92E-04	3.76E-01	F	1.11E-03	45	15	-8.3
Th-232	2.73E-03	1.64E+00	W	5.21E-04	8.55E-04	4.07E-01	F	4.78E-04	-69	-75	-8.3
U-234	2.83E-04	1.32E-01	Y	4.02E-04	1.83E-04	3.48E-02	S	3.46E-04	-35	-74	-14
U-235	2.66E-04	1.23E-01	Y	7.21E-01	1.73E-04	3.13E-02	S	7.01E-01	-35	-75	-2.8
U-238	2.55E-04	1.18E-01	Y	1.03E-04	1.65E-04	2.97E-02	S	1.71E-04	-35	-75	66

[a] RESRAD Version 6.5 dose evaluations of the isotopes shown were conducted during PDIR-FSSE reports and PRAR-FSSE reports and always included DCFs for progeny ingrowth throughout the 1,000-year period modeled.

[b] FGR-11 and FGR-12 DCFs have been used until March 2015 to calculate doses and post-remedial residual doses associated with soil/sediment at the SLS properties in FUSRAP PDIR-FSSE reports and PRAR-FSSE reports.

[c] RESRAD Version 7.0 DCFPAK 3.02 (adult) dose library contains updated internal and external DCFs as calculated and presented in *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014), based on the ICRP-107 nuclear decay database. A gray-shaded cell indicates the 2014 updated DCF (ORNL 2014) increased from the FGR-11 and FGR-12 value. An unshaded cell indicates that the DCF either did not change or decreased relative to the FGR-11 and FGR-12 value.

[d] A positive percent change means that the 2014 updated DCF (ORNL 2014) is greater than the corresponding FGR-11 and FGR-12 value. A negative percent change means that the 2014 updated DCF (ORNL 2014) is less than the corresponding FGR-11 and FGR-12 value. A zero (0) indicates that there has been no change in the 2014 updated DCF (ORNL 2014) relative to the corresponding FGR-11 and FGR-12 value.

[e] Inhalation classifications indicate the relative amount of time it takes for the inhaled contaminant to become absorbed into the bloodstream from the lung. For the FGR-11 and FGR-12 DCFs presented in the above table, the classifications are as follows: D (Days), W (Weeks), and Y (Years). For the 2014 updated DCF (ORNL 2014) in the above table, the classifications are as follows: F (Fast) and S (Slow).

Notes:
mrem/pCi - millirem per picocurie

Table VII-4A. Carcinogenic Toxicity Factor Updates for Metal Contaminants of Concern at the SLDS

CAS No.	COCs	SLDS FS and SLDS ROD Carcinogenic Toxicity Factors[a]						Current Cancer Carcinogenic Toxicity Factors[a,b]					
		CSF_o $(mg/kg\text{-}day)^{-1}$	CSF_d[c] $(mg/kg\text{-}day)^{-1}$	CSF_i $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	GIABS[c] (unitless)	ABS[d] (unitless)	CSF_o $(mg/kg\text{-}day)^{-1}$	CSF_d[c] $(mg/kg\text{-}day)^{-1}$	CSF_i $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	GIABS[c] (unitless)	ABS[d] (unitless)
7440-38-2	Arsenic	1.50E+00	3.66E+00	1.51E+01	4.30E-03	0.41	Unknown	1.50E+00 [e]	1.50E+00	1.51E+01	4.30E-03 [f]	1	0.03
7440-43-9	Cadmium	---	---	6.30E+00	1.80E-03	---	Unknown	---	---	6.30E+00	1.80E-03 [g]	---	0.001

[a] The dashed line ("---") indicates no toxicity value available.

[b] For current toxicity factors, a gray-shaded cell indicates that for the purpose of determining health protectiveness in this five-year review report, the current toxicty factor is more health-conservative than the corresponding SLDS FS and SLDS ROD value. An unshaded cell indicates that the current toxicity factor is the same as or less health-conservative than the corresponding SLDS FS and SLDS ROD value.

[c] CSF_d values are calculated from the corresponding CSF_o and GIABS values, per the RAGS Part E (USEPA 2004). GIABS values used in the SLDS FS (USACE 1998d) to determine CSF_d values from the corresponding CSF_o values were not available. Therefore, the SLDS FS and SLDS ROD GIABS values presented in this table were determined from Table 2-15 of the SLDS FS, based on methodologies presented in the RAGS Part E (USEPA 2004).

[d] Values for dermal ABS are not presented in the SLDS FS. Current values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented and used by the RSL tables (USEPA 2015a).

[e] "Prevalence of Skin Cancer in an Endemic Area of Chronic Arsenicism in Taiwan" (Tseng et al. 1968) and "Effects and Dose-Response Relationships of Skin Cancer and Blackfoot Disease with Arsenic" (Tseng 1977) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[f] "Approaches to Epidemiologic Analysis of Prospective and Retrospective Studies: Example of Lung Cancer and Exposure to Arsenic" (Brown and Chu 1983a), "Implications of the Multistage Theory of Carcinogenesis Applied to Occupational Arsenic Exposure" (Brown and Chu 1983b), "A New Method for the Analysis of Cohort Studies: Implications of the Multistage Theory of Carcinogenesis Applied to Occupational Arsenic Exposure" (Brown and Chu 1983c); "Arsenic and Respiratory Cancer in Man: Follow-up of an Occupational Study" (Lee-Feldstein 1983); *Arsenic and Respiratory Cancer Among a Sample of Anaconda Smelter Workers* (Higgins 1982); "Cancer Among Workers Exposed to Arsenic and Other Substances in a Copper Smelter" (Enterline and Marsh 1982) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[g] "Mortality Among a Cohort of U.S. Cadmium Production Workers: An Update" (Thun et al. 1985) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

Table VII-4B. Noncarcinogenic Toxicity Factor Updates for Metal Contaminants of Concern at the SLDS

CAS No.	COCs	SLDS FS and SLDS ROD Noncarcinogenic Toxicity Factors[a]						Current Noncarcinogenic Toxicity Factors[a,b,c]					
		RfD_o (mg/kg-day)	RfD_d[d] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[d] (unitless)	ABS[e] (unitless)	RfD_o (mg/kg-day)	RfD_d[d] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[d] (unitless)	ABS[e] (unitless)
7440-38-2	Arsenic	3.00E-04	3.00E-04	---	---	1	Unknown	3.00E-04 [f]	3.00E-04	4.29E-06	1.50E-05 [g]	1	0.03
7440-43-9	Cadmium	1.00E-03	1.00E-05	5.7E-05	2.0E-04	0.01	Unknown	1.00E-03 [h]	2.50E-05	---	1.00E-05 [i]	0.025	0.001

[a] The dashed line ("---") indicates no toxicity value available.

[b] For current toxicity factors, a gray-shaded cell indicates that for the purpose of determining health protectiveness in this five-year review report, the current toxicty factor is more health-conservative than the corresponding SLDS FS and SLDS ROD value. An unshaded cell indicates that the current toxicity factor is the same as or less health-conservative than the corresponding SLDS FS and SLDS ROD value.

[c] No information was provided in the SLDS FS that stated if chronic or subchronic RfDs were used for deriving soil RGs for the industrial/construction worker, so it is assumed that chronic values were used. Therefore, only chronic values are provided for current RfDs and RfCs for determining health protectiveness of the remedy.

[d] RfD_d values are calculated from the corresponding RfD_o and GIABS values, per the RAGS Part E (USEPA 2004). GIABS values used in the SLDS FS (USACE 1998d) to determine RfD_d values from the corresponding RfD_o values were not available. Therefore, the SLDS FS and SLDS ROD GIABS values presented in this table were determined from Table 2-15 of the SLDS FS, based on methodologies presented in the RAGS Part E (USEPA 2004).

[e] Values for dermal ABS are not presented in the SLDS FS. Current values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented and used by the RSL tables (USEPA 2015a).

[f] "Prevalence of Skin Cancer in an Endemic Area of Chronic Arsenicism in Taiwan" (Tseng et al. 1968) and "Effects and Dose-Response Relationships of Skin Cancer and Blackfoot Disease with Arsenic" (Tseng 1977) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[g] *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CALEPA 2015). Tier 3 value.

[f] A chronic RfC of 2.00E-05 mg/m^3 is indicated by the RSL tables for cadmium, which cites the CALEPA. A chronic RfC of 1.00E-05 mg/m^3 is indicated in the RAIS, which cites the ATSDR; however, because neither RfC was found in the CALEPA database or ATSDR, no value is being used to determine the current health protectiveness status of the cadmium RGs.

[h] *Drinking Water Criteria Document on Cadmium* (USEPA 1985) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[i] *Toxicological Profile for Cadmium* (ATSDR 2012b). Tier 3 value.

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Table VII-5. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in Plant 2 Soil at the SLDS

Receptor[a]	Target Organ HIs (Unitless) Estimated for Plant 2[b]				Plant 2 Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI		
Industrial/Construction Worker	0.05	0.003	0.05	0.003	5E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.01	0.0008	0.01	0.0008	6E-08	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those for industrial land use scenarios presented in the SLDS FS, Appendix D (USACE 1998d), as well as all receptors considered for risk evaluations conducted in the Plant 2 PRAR (USACE 2002b). Protection of the industrial/construction worker from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs for metal COCs (arsenic and cadmium) in the SLDS FS (USACE 1998d).

[b] The HIs and CRs presented were estimated over all metal COCs (arsenic and cadmium) identified in soil at properties within the former uranium ore processing boundary at the SLDS. Evaluated exposure routes for metals included soil ingestion, dermal contact with soil and dust inhalation. EPCs from the Plant 2 PRAR-FSSE report (USACE 2002b) were applied as the source terms in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-2, VII-4A, and VII-4B, which include both the SLDS FS (USACE 1998d) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-3 of Appendix F of this five-year review report.

Table VII-6. Radiological Cancer Risk and Dose Comparisons Between PRAR-FSSE Report and Third Five-Year Review Report Evaluations Conducted for DT-10 Soil at the SLDS

Site	Property	Receptor	PRAR-FSSE Report Results[a]		Third Five-Year Review Results[b]	
			Risk (Unitless)	Dose (mrem/yr)	Risk (Unitless)	Dose (mrem/yr)
SLDS	DT-10	Resident Gardener (Ground Cover Absent)	1E-04	6	1E-04	6
		Resident Gardener (Ground Cover Present)	6E-05	3	5E-05	3
		Industrial Worker	3E-05	1	3E-05	1
		Utility Worker	6E-08	0.08	6E-08	0.08

[a] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the associated PRAR-FSSE report [USACE 2010h]). The following RESRAD model version and CSF and DCF libraries were used in the PRAR-FSSE report documents for DT-10: RESRAD Version 6.3, FGR-13 Risk Library (Morbidity), FGR-13 Dose Library (Morbidity).

[b] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the supporting RESRAD plot data presented in tables F-2-2 through F-2-9). The Third Five-Year Review of DT-10 and VP-53 radiological risk and dose utilized RESRAD Version 7.0, with the DCFPAK 3.02 risk and dose library (adult), which incorporates the 2014 USEPA CSF and ICRP-107 DCF updates, respectively.

Table VII-7. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in DT-10 Soil at the SLDS

Receptor[a]	Target Organ HIs (Unitless) Estimated for DT-10[b]				DT-10 Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI		
Industrial/Construction Worker	0.2	0.0008	0.2	0.0008	2E-05	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.03	0.0003	0.03	0.0003	2E-07	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those for industrial land use scenarios presented in the SLDS FS, Appendix D (USACE 1998d), as well as receptors considered for risk evaluations conducted in the DT-10 PRAR-FSSE report (USACE 2010h). Protection of the industrial/construction worker from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs for metal COCs (arsenic and cadmium) in the SLDS FS (USACE 1998d).

[b] The HIs and CRs presented were estimated over all metal COCs (arsenic and cadmium) identified in soil at properties within the former uranium ore processing boundary at the SLDS. Evaluated exposure routes for metals included soil ingestion, dermal contact with soil and dust inhalation. EPCs from the DT-10 PRAR-FSSE report (USACE 2010h) were applied as the source terms in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-2, VII-4A, and VII-4B, which include both the SLDS FS (USACE 1998d) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-3 of Appendix F of this five-year review report.

Table VII-8. Remedial Action Objectives for Remediation of the SLDS Operable Unit

Medium	Remedial Action Objective
Soil	Prevent exposures from surface residual contamination in soils greater than the criteria prescribed in 40 *CFR* 192.
	Eliminate or minimize the potential for humans or biota to contact, ingest, or inhale soil containing COCs.
	Eliminate or minimize volume, toxicity, and mobility of impacted soil.
	Eliminate or minimize the potential for migration of radioactive materials offsite.
	Eliminate or minimize potential exposure to external gamma radiation.
	Comply with ARARs.
Ground Water	Remove sources of COCs in the A Unit.
	Continue to maintain low concentrations of OU COCs in the B Unit.

Table VII-9. Radiological Exposure Factors and RESRAD Input Values for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Parameter	Unit	RESRAD Default[a]	North St. Louis County Sites Scenarios (Latty Avenue & SLAPS)							References/Comments
			Industrial Worker	Construction Worker	Utility Worker	Road Worker	Recreational User/Trespasser	Maintenance Worker	Age-Adjusted Resident	
Soil Concentrations/Transport										
Soil concentrations	pCi/g	NA	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	
Distribution coefficients	cm^3/g	Element-Specific/ RESRAD Default	RESRAD Default	RESRAD Default	RESRAD Default	RESRAD Default	RESRAD Default	RESRAD Default	RESRAD Default	Distribution coefficients are based on each radionuclide and defined in RESRAD.
Time since placement of material	year	0	0	0	0	0	0	0	0	RESRAD Default
Groundwater concentration	pCi/L	0	0	0	0	0	0	0	0	RESRAD Default
Solubility limit	moles/L	0	0	0	0	0	0	0	0	RESRAD Default
Leach rate	L/year	0	0	0	0	0	0	0	0	RESRAD Default
Use plant/soil ratio (checked/not checked)		not checked	not checked	not checked	not checked	not checked	not checked	not checked	not checked	RESRAD Default
Contaminated Zone Parameters										
Area of contaminated zone	m^2	10,000	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-Specific	Site-specific area
Thickness of contaminated zone	m	2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	NC ROD (USACE 2005a)
Length parallel to aquifer flow	m	100	not used	not used	not used	not used	not used	not used	not used	Site-specific length
Cover/Hydrological Data										
Cover depth	m	0	0	0	0	0	0	0	0	RESRAD Default.
Density of cover material	g/cm^3	1.5	not used	not used	not used	not used	not used	not used	not used	Assumes no cover
Cover depth erosion rate	m/year	0.001	not used	not used	not used	not used	not used	not used	not used	Assumes no cover
Density of contaminated zone	g/cm^3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	RESRAD Default
Contaminated zone erosion rate	m/year	0.001	0.00006	0.00006	0.00006	0.00006	0.00006	0.00006	0.00006	*Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil* (DOE 1993a), page 84, 3rd paragraph last sentence.
Contaminated zone total porosity	unitless	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	RESRAD Default
Contaminated zone field capacity	unitless	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	RESRAD Default
Contaminated zone hydraulic conductivity	m/year	10	10	10	10	10	10	10	10	RESRAD Default
Contaminated zone b parameter	unitless	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	RESRAD Default
Humidity in air	g/m^3	8	not used	not used	not used	not used	not used	not used	not used	
Evapotranspiration coefficient	unitless	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	RESRAD Default
Average annual wind speed	m/second	2	2	2	2	2	2	2	2	RESRAD Default
Precipitation	m/year	1	1	1	1	1	1	1	1	RESRAD Default
Irrigation	m/year	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	RESRAD Default
Irrigation mode	unitless	Overhead	Overhead	Overhead	Overhead	Overhead	Overhead	Overhead	Overhead	RESRAD Default
Runoff coefficient	unitless	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	RESRAD Default
Watershed area for nearby stream or pond	m^2	1,000,000	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Accuracy for water/soil computations	unitless	0.001	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated Zone Data										
Saturated zone density	g/cm^3	1.5	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone total porosity	unitless	0.4	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone effective porosity	unitless	0.2	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone field capacity	unitless	0.2	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone hydraulic conductivity	m/year	100	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone hydraulic gradient	unitless	0.02	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Saturated zone b parameter	unitless	5.3	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Water table drop rate	m/year	0.001	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Well pump intake depth (m below water table)	m	10	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Model: ND or MB	unitless	ND	ND	ND	ND	ND	ND	ND	ND	Saturated zone is typically not evaluated.
Well pumping rate	m^3/year	250	not used	not used	not used	not used	not used	not used	not used	Saturated zone is typically not evaluated.
Unsaturated Zone Data										
Number of unsaturated zone strata #	unitless	1	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone thickness	m	4	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone density	g/cm^3	1.5	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone total porosity	unitless	0.4	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone effective porosity	unitless	0.2	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone field capacity	unitless	0.2	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone hydraulic conductivity	m/year	10	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.
Unsaturated zone b parameter	unitless	5.3	not used	not used	not used	not used	not used	not used	not used	Water migration in unsaturated zone is typically not evaluated.

Table VII-9. Radiological Exposure Factors and RESRAD Input Values for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Parameter	Unit	RESRAD Default[a]	North St. Louis County Sites Scenarios (Latty Avenue & SLAPS)							References/Comments
			Industrial Worker	Construction Worker	Utility Worker	Road Worker	Recreational User/Trespasser	Maintenance Worker	Age-Adjusted Resident	
Occupancy Data										
Inhalation rate	m^3/year	8,400	4,836	11,388	11,388	11,388	4,503	4,836	4,836	The inhalation rates shown are currently used in RESRAD calculations, per the RAGS Part A (USEPA 1989), for determining radiological risk, unlike the evaluations of metals, for which RAGS Part A methodology has been replaced with the Inhalation Dosimetry Methodology, per the RAGS Part F (USEPA 2009a). Please see the comment for "Inhalation Soil as Dust" in Table VII-9 for additional information.
Mass loading for inhalation	g/m^3	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	RESRAD default value is used for all radiological evaluations, even though this value is considered highly conservative for recreational and residential exposures relative to USEPA's particulate emission factor of 1.36E+09 m^3/kg, which equates to a mass loading factor of 7.4E-07 g/m^3. For evaluating radiological exposures via inhalation of dusts, the more conservative RESRAD default mass loading factor is used for the recreational and residential scenarios because the dust inhalation pathway is typically an insignificant contributor to risk and dose at the North St. Louis County Sites.
Exposure duration	year	30	25	1	1	1	9	6.6	30 (26)	RAGS Part A (USEPA 1989), *Exposure Factors Handbook* (USEPA 1997b), NC FS (USACE 2003a). Updated exposure duration for age-adjusted resident (26 years) (USEPA 2015a) assumes exposure durations for a child and adult, at one residence, of 6 years and 20 years, respectively.
Indoor dust filtration factor	unitless	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	RESRAD Default
External gamma shielding factor	unitless	0.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	RESRAD Default
Fraction of time spent indoors	unitless	0.5	0.2	0	0	0	0.2	0.0119	0.655	Based on info in NC FS (USACE 2003a).
Fraction of time spent outdoors (on site)	unitless	0.25	0.0285	0.228	0.00913	0.082	0.0285	0.0119	0.0799	Based on info in NC FS (USACE 2003a).
Shape of the contaminated zone: Circular; Non-Circular	unitless	Circular	Circular	Circular	Circular	Circular	Circular	Circular	Circular	RESRAD Default
Ingestion Dietary Data										
Fruits, vegetables and grain consumption	kg/year	160	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Leafy vegetable consumption	kg/year	14	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Milk consumption	L/year	92	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Meat and poultry consumption	kg/year	63	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Fish consumption	kg/year	5.4	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Other seafood consumption	kg/year	0.9	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Soil ingestion rate	g/year	36.5	18.25	175.2	175.2	175.2	18.25	175.2	43.8 (44.9)	RAGS Part A (USEPA 1989), *Exposure Factors Handbook* (USEPA 1997b). Updated soil ingestion rate for age-adjusted resident increased by approximately 2.5 percent due to *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updated exposure durations used to age-adjust the ingestion rate.
Drinking water intake	L/year	510	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of drinking water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of household water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of livestock water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of irrigation water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of aquatic food	unitless	0.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of plant food	unitless	-1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of meat	unitless	-1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination fraction of milk	unitless	-1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.

Table VII-9. Radiological Exposure Factors and RESRAD Input Values for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Parameter	Unit	RESRAD Default[a]	North St. Louis County Sites Scenarios (Latty Avenue & SLAPS)							References/Comments
			Industrial Worker	Construction Worker	Utility Worker	Road Worker	Recreational User/Trespasser	Maintenance Worker	Age-Adjusted Resident	
Ingestion Non-Dietary Data										
Livestock fodder intake for meat	kg/day	68	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Livestock fodder intake for milk	kg/day	55	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Livestock water intake for meat	L/day	50	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Livestock water intake for milk	L/day	160	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Livestock soil intake	kg/day	0.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Mass loading for foliar deposition	g/m^3	0.0001	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Depth of soil mixing layer	m	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	RESRAD Default
Depth of roots	m	0.9	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Drinking water fraction from ground water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Household water fraction from ground water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Livestock fraction from ground water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Irrigation fraction from ground water	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Plant Factors										
Wet weight crop yield for non-leafy vegetables	kg/m^2	0.7	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Wet weight crop yield for leafy vegetables	kg/m^2	1.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Wet weight crop yield for fodder	kg/m^2	1.1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Growing season for non-leafy vegetables	years	0.017	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Growing season for leafy vegetables	years	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Growing season for fodder	years	0.08	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Translocation factor for non-leafy vegetables	unitless	0.1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Translocation factor for leafy vegetables	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Translocation factor for fodder	unitless	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Weathering removal constant for vegetation	L/year	20	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Dry foliar interception fraction for non-leafy vegetables	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Dry foliar interception fraction for leafy vegetables	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Dry foliar interception fraction for fodder	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Wet foliar interception fraction for non-leafy vegetables	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Wet foliar interception fraction for leafy vegetables	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Wet foliar interception fraction for fodder	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage Times										
Storage time: fruits, non-leafy vegetables, and grain	days	14	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: leafy vegetables	days	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: milk	days	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: meat and poultry	days	20	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: fish	days	7	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: crustacea and mollusks	days	7	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: well water	days	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: surface water	days	1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Storage time: livestock fodder	days	45	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.

Table VII-9. Radiological Exposure Factors and RESRAD Input Values for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Parameter	Unit	RESRAD Default[a]	North St. Louis County Sites Scenarios (Latty Avenue & SLAPS)							References/Comments
			Industrial Worker	Construction Worker	Utility Worker	Road Worker	Recreational User/Trespasser	Maintenance Worker	Age-Adjusted Resident	
Radon										
Cover total porosity	unitless	0.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Cover volumetric water content	unitless	0.05	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Cover radon diffusion coefficient	m^2/second	0.000002	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building foundation thickness	m	0.15	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building foundation density	g/cm^3	2.4	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building foundation total porosity	unitless	0.1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building foundation volumetric water content	unitless	0.03	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building foundation radon diffusion coefficient	m^2/second	0.0000003	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Contamination radon diffusion coefficient	m^2/second	0.000002	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Radon vertical dimension of mixing	m	2	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building air exchange rate	L/hour	0.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building height	m	2.5	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Building indoor area factor	unitless	0	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Foundation depth below ground surface	m	-1	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Rn-222 emanation coefficient	unitless	0.25	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Rn-220 emanation coefficient	unitless	0.15	not used	not used	not used	not used	not used	not used	not used	Not applicable to North St. Louis County Sites receptor scenarios.
Pathways										
Pathway – external gamma	unitless	Active	Active	Active	Active	Active	Active	Active	Active	NC FS (USACE 2003a) and NC ROD (USACE 2005a).
Pathway – inhalation (w/o radon)	unitless	Active	Active	Active	Active	Active	Active	Active	Active	NC FS (USACE 2003a) and NC ROD (USACE 2005a).
Pathway – plant ingestion	unitless	Active	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	
Pathway – meat ingestion	unitless	Active	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	
Pathway – milk ingestion	unitless	Active	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	
Pathway – aquatic foods	unitless	Active	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	
Pathway – drinking water	unitless	Active	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	
Pathway – soil ingestion	unitless	Active	Active	Active	Active	Active	Active	Active	Active	NC FS (USACE 2003a) and NC ROD (USACE 2005a).
Pathway – radon	unitless	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	Suppressed	

[a] Gray shading indicates RESRAD default values are used. Non-shaded cells indicate values other RESRAD default values are used.

Table VII-10. Soil Exposure Factor Updates for Metal Contaminants of Concern for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Exposure Factor Category	Exposure Parameter	Exposure Parameter Description	Units	Input Values for Exposure Factors[a]									Comments
				Industrial Worker	Construction Worker	Utility Worker	Road Worker	Maintenance Worker	Recreational User/ Trespasser	Resident Child (Ages 0 to 6 Years)	Resident Adult	Age-Adjusted Resident	
General	AT_c	Averaging Time, Carcinogenic (Ingestion & Dermal Contact)	days	25,550	25,550	25,550	25,550	25,550	25,550	25,550	25,550	25,550	RAGS Part A (USEPA 1989) standard default value for average lifetime equal to 70 years x 365 days/year.
	AT_{nc}	Averaging Time, Noncarcinogenic (Ingestion & Dermal contact)	days	9,125	365	365	365	2,409	3,285	2,190	8,760 (7,300)	10950 (9,490)	AT_{nc} = ED (years) x 365 (days/year). Updated averaging times for the resident adult and age-adjusted resident is due to *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updated exposure durations of 20 years and 26 years, respectively.
	BW	Body Weight	kg	70 (80)	70 (80)	70 (80)	70 (80)	70 (80)	50 (44.3[b])	50 (15[c])	70 (80)	NA	The updated adult body weight of 80 kg is the *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updated default value. Body weight for child resident (ages 0 to 6 years) should be 15 kg, rather than 50 kg, the latter of which is more representative of an older child/adolescent. No single value is applicable to the age-adjusted resident because the child and adult BW values are used in the calculations of the age-adjusted soil intake rates.
	EF	Exposure Frequency	days/year	250	250	10	90	26	26	350	350	350	Values from NC FS (USACE 2003a) represent current values.
	ED	Exposure Duration	years	25	1	1	1	6.6	9	6	24 (20)	NA	The updated exposure duration for the resident adult is the *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updated default value. Site-specific values were selected in the NC FS (USACE 2003a) for the maintenance worker and recreational user/trespasser. No single value is applicable to the age-adjusted resident because the ED values for both the child and adult are used in the calculations of the age-adjusted soil intake rates.
Incidental Soil Ingestion	IR_s	Soil Ingestion Rate	mg/day	50	480	480	480	480	50	200	100	NA	For the age-adjusted resident, the IR_s values from the NC FS (USACE 2003a) for both the child (200 mg/day) and adult (100 mg/day) is used in the calculation of the IFS_{adj}.
	IFS_{adj}	Age-Adjusted Soil Ingestion Rate	mg-year/kg-day	NA	NA	NA	NA	NA	NA	NA	NA	58.3 (105[d])	Applicable only to the age-adjusted resident calculations. Value updated to reflect current child (ages 0-6 years) body weight of 15 kg, as well as *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updates for adult exposure duration (20 years) and body weight (80 kg).
	FI	Fraction of Soil Ingested from the Site	unitless	1	1	1	1	1	1	1	1	1	Assumes 100 percent of ingested soil came from the site.
	CF	Conversion Factor	mg/kg	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	Unit conversion from kg soil to mg soil.
Dermal Contact with Soil	SA	Skin Surface Area Available for Exposure	cm^2	5,700 (3,470[e])	5,700 (3,470[e])	5,700 (3,470[e])	5,700 (3,470[e])	5,700 (3,470[e])	3,400 (7,170[f])	5,700 (2,690[g])	5,700 (6,032[h])	NA	Updated *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) values obtained for workers and residents. For the age-adjusted resident, the SA values for both the child and adult are used in the calculation of the DFS_{adj}.
	AF	Soil-to-Skin Adherence Factor	mg/cm^2	0.1 (0.12)	0.28	0.28	0.28	0.035 (0.16[i])	0.3 (0.11[i])	0.08 (0.2[c])	0.08 (0.07[c])	NA	For the age-adjusted resident, the AF values for both the child and adult are used in the calculation of the DFS_{adj}.
	DFS_{adj}	Age-Adjusted Dermal Factor for Soil	mg-year/kg-day	NA	NA	NA	NA	NA	NA	NA	NA	211 (321[k])	Applicable only to the age-adjusted resident calculations. Value updated to reflect updates for the child (ages 0-6 years) body weight of 15 kg, skin surface area, and adherence factor, as well as for the adult skin surface area, adherence factor, exposure duration, and body weight, per the 2011 Exposure Factors Handbook and the *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updates.
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	Chemical-Specific	During the NC FS (USACE 2003a), the ABS value for all metals, except for cadmium, was 0.001. The NC FS value for cadmium was 0.01. Currently, only ABS values for arsenic (0.03) and cadmium (0.001) are available (USEPA 2004). There are ABS values for the other metal COCs that are currently available. Therefore, the current values for arsenic and cadmium are more and less health-conservative, respectively.
	CF	Conversion Factor	mg/kg	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	Unit conversion from kg soil to mg soil.

Table VII-10. Soil Exposure Factor Updates for Metal Contaminants of Concern for Industrial, Recreational, and Residential Land Use Scenarios at the Latty Avenue and SLAPS Properties and SLAPS VPs

Exposure Factor Category	Exposure Parameter	Exposure Parameter Description	Units	Input Values for Exposure Factors[a]									Comments
				Industrial Worker	Construction Worker	Utility Worker	Road Worker	Maintenance Worker	Recreational User/ Trespasser	Resident Child (Ages 0 to 6 Years)	Resident Adult	Age-Adjusted Resident	
Inhalation of Soil as Dust	IR_a	Air Inhalation Rate	m^3/day	13.2 (NA)	31.2 (NA)	31.2 (NA)	31.2 (NA)	31.2 (NA)	12.3 (NA)	NA (NA)	NA (NA)	13.2 (NA)	Use of an inhalation rate (and body weight) to determine chemical intake via the inhalation exposure route in the NC FS was consistent with the RAGS Part A (USEPA 1989) methodology. Inhalation rates shown were obtained from Table D-2 of the NC FS and converted from m^3/hour to m^3/day (note: no inhalation rates were provided in the NC FS for a resident child and a resident adult). However, the RAGS Part A methodology is no longer consistent with the USEPA's current Inhalation Dosimetry Methodology (per the RAGS Part F [USEPA 2009a]). This is because it has been determined that the amount of chemical reaching the target site is not a simple function of the inhalation rate and body weight. Instead the interaction between the inhaled contaminant and the respiratory tract is affected by factors such as species-specific relationships of exposure concentrations to deposited/delivered doses and physiochemical characteristics of the inhaled contaminant. The target site where the toxic effect occurs is also considered when applying dosimetric adjustments to experimental concentrations. Therefore, a current value for the inhalation rate is NA.
	IFA_{adj}	Age-Adjusted Inhalation Factor	m^3-year/kg-day	NA	NA	NA	NA	NA	NA	NA	NA	NA	Inhalation rate accounted for in the USEPA derivation of RfC and unit risk values, per the RAGS Part F (USEPA 2009a) .
	$AT_{c\text{-}inh}$	Averaging Time, Carcinogenic (Inhalation)	hours	613,200	613,200	613,200	613,200	613,200	613,200	613,200	613,200	613,200	$AT_{c\text{-}inh}$ = 70 years x 365 days/year x 24 hours/day (per the RAGS Part F [USEPA 2009a]).
	$AT_{nc\text{-}inh}$	Averaging Time, Noncarcinogenic (Inhalation)	hours	219,000	8,760	8,760	8,760	57,816	78,840	52,560	210,240 (175,200)	NA	$AT_{nc\text{-}inh}$ = ED (years) x 365 days/year x 24 hours/day (per the RAGS Part F [USEPA 2009a]). Value for resident adult updated to reflect the RSL tables (USEPA 2015a) updated exposure duration of 20 years.
	PEF	Particulate Emission Factor	m^3/kg	1.32E+09 (1.00E+07)	1.32E+09 (1.00E+07)	1.32E+09 (1.00E+07)	1.32E+09 (1.00E+07)	1.32E+09 (1.00E+07)	1.32E+09 (1.36E+09)	1.32E+09 (1.36E+09)	1.32E+09 (1.36E+09)	1.32E+09 (1.36E+09)	The PEF presented in parentheses is converted from the mass loading factor for inhalation currently used in PRARs for radiological dose and risk evaluations (0.0001 g/m^3). This value is more health conservative than the PEF value (1.32E+09 m^3/kg) used in the NC FS, Appendix D, Attachment 11 (USACE 2003a), as well as the USEPA's current default value of 1.36E+09 m^3/kg. Therefore, the current PRAR value is retained for evaluation of health protectiveness of workers in this five-year review. The USEPA's current default value of 1.36E+09 m^3/kg is considered representative of non-worker exposure conditions and is being retained for evaluations of the recreational user and residential scenarios.

[a] All exposure factors not in parentheses were obtained from the NC FS (USACE 2003a) and were used to derive soil RGs for metal COCs. Values in parentheses are the most current values according to the cited USEPA guidance that differ from the NC FS values. Gray-shaded cell indicates that the NC FS exposure factor was updated to the current value, which is more health-conservative than NC FS value. Unshaded cell with value in parentheses indicates that the NC FS exposure factor was updated to the current value, which is less health-conservative than NC FS value. Unshaded cell with no values in parentheses indicates that there has been no change in the NC FS exposure factor.

[b] Value obtained from the 2011 Exposure Factors Handbook, Highlights, Table 8-1, Recommended Values for Body Weight (USEPA 2011).

[c] Value was obtained from the RSL tables (USEPA 2015a).

[d] IFS_{adj} recalculated to reflect updated body weight for resident child and updated exposure duration and body weight for adult.

[e] Exposed worker surface area calculated as the sum of mean adult values (averaged over males and females) over head, hands, and forearms and was obtained from the *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updates.

[f] Exposed recreational user (ages 6 to 14 years) surface area calculated as the sum of mean values, provided in the 2011 Exposure Factors Handbook (USEPA 2011), Highlights, Table 7-2, for head, arms, hands, legs, and feet.

[g] Exposed young child (ages 0 to 6 years) surface area obtained from the RSL tables (USEPA 2015a) and represents head, hands, forearms, lower legs, and feet.

[h] Exposed resident adult surface area obtained from the *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a) updates and represents head, hands, forearms, lower legs, and feet.

[i] Value obtained from the 2011 Exposure Factors Handbook (USEPA 2011), Highlights, Table 7-3, Adults - Activities with Soil.

[j] Value obtained from the 2011 Exposure Factors Handbook (USEPA 2011), Highlights, Table 7-3, Children - Outdoor Sports.

[k] DFS_{adj} recalculated to reflect updated surface areas, adherence factors, body weights, and adult exposure duration per the *2011 Exposure Factors Handbook* (USEPA 2011) and *Human Health Evaluation Manual, Supplemental Guidance: Update of Superfund Default Exposure Factors* (USEPA 2014a).

Notes:

mg-year/kg-day - milligram-year per kilogram-day, m^3-year/kg-day - cubic meter-year per kilogram-day, NA - not applicable.

Table VII-11A. Carcinogenic Toxicity Factor Updates for Metal Contaminants of Concern at the Latty Avenue and SLAPS Properties and SLAPS VPs

CAS No.	COCs	NC FS Carcinogenic Toxicity Factors[a]						Current Cancer Carcinogenic Toxicity Factors[a,b]					
		CSF_o $(mg/kg\text{-}day)^{-1}$	CSF_d[c] $(mg/kg\text{-}day)^{-1}$	CSF_i $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	GIABS[c] (unitless)	ABS[d] (unitless)	CSF_o $(mg/kg\text{-}day)^{-1}$	CSF_d[c] $(mg/kg\text{-}day)^{-1}$	CSF_i $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	GIABS[c] (unitless)	ABS[d] (unitless)
7440-36-0	Antimony	---	---	---	---	0.02	0.001	---	---	---	---	0.15	---
7440-38-2	Arsenic	1.50E+00	3.66E+00	1.51E+01	4.30E-03	0.41	0.001	1.50E+00 [e]	1.50E+00	1.51E+01	4.30E-03 [f]	1	0.03
7440-39-3	Barium	---	---	---	---	0.07	0.001	---	---	---	---	0.07	---
7440-43-9	Cadmium	---	---	6.30E+00	1.80E-03	0.01	0.01	---	---	6.30E+00	1.80E-03 [g]	0.025	0.001
7440-47-3	Chromium (VI)	---	---	4.11E+01	1.17E-02	0.02	0.001	5.00E-01 [h]	2.00E+01	2.94E+02	1.20E-02 [i]	0.025	---
7439-98-7	Molydenum	---	---	---	---	0.38	0.001	---	---	---	---	1	---
7440-02-0	Nickel[j]	---	---	---	---	0.27	0.001	---	---	9.10E-01	2.60E-04 [k]	0.04	---
7782-49-2	Selenium	---	---	---	---	0.44	0.001	---	---	---	---	1	---
7440-28-0	Thallium[l]	---	---	---	---	0.2	0.001	---	---	---	---	1	---
7440-61-1	Uranium	---	---	---	---	0.85	0.001	---	---	---	---	1	---
7440-62-2	Vanadium	---	---	---	---	0.01	0.001	---	---	---	---	0.026	---

[a] The dashed line ("---") indicates no toxicity value available.

[b] For current toxicity factors, a gray-shaded cell indicates that for the purpose of determining health protectiveness in this five-year review report, the current toxicty factor is more health-conservative than the corresponding NC FS value. An unshaded cell indicates that the current toxicity factor is the same as or less health-conservative than the corresponding NC FS value.

[c] CSF_d values are calculated from the corresponding CSF_o and GIABS values, per the RAGS Part E (USEPA 2004). GIABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current GIABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[d] ABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current ABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[e] "Prevalence of Skin Cancer in an Endemic Area of Chronic Arsenicism in Taiwan" (Tseng et al. 1968) and "Effects and Dose-Response Relationships of Skin Cancer and Blackfoot Disease with Arsenic" (Tseng 1977) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[f] "Approaches to Epidemiologic Analysis of Prospective and Retrospective Studies: Example of Lung Cancer and Exposure to Arsenic" (Brown and Chu 1983a), "Implications of the Multistage Theory of Carcinogenesis Applied to Occupational Arsenic Exposure" (Brown and Chu 1983b), "A New Method for the Analysis of Cohort Studies: Implications of the Multistage Theory of Carcinogenesis Applied to Occupational Arsenic Exposure" (Brown and Chu 1983c); "Arsenic and Respiratory Cancer in Man: Follow-up of an Occupational Study" (Lee-Feldstein 1983); *Arsenic and Respiratory Cancer Among a Sample of Anaconda Smelter Workers* (Higgins 1982); "Cancer Among Workers Exposed to Arsenic and Other Substances in a Copper Smelter" (Enterline and Marsh 1982) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[g] "Mortality Among a Cohort of U.S. Cadmium Production Workers: An Update" (Thun et al. 1985) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[h] *Derivation of Ingestion-Based Soil Remediation Criterion for Cr+6 Based on the NTP Chronic Bioassay Data for Sodium Dichromate Dihydrate* (NJDEP 2009). Tier 3 value.

[i] *Consideration of Chromium as an Industrial Carcinogen* (Mancuso 1975) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[j] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC-contaminated soil at the North St. Louis County Sites.

[k] *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CALEPA 2015). Tier 3 value.

[l] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS.

Table VII-11B. Noncarcinogenic Toxicity Factor Updates for Subchronic Exposures to Metal Contaminants of Concern at the Latty Avenue and SLAPS Properties and SLAPS VPs

CAS No.	COCs	NC FS Noncarcinogenic Toxicity Factors for Subchronic Exposures[a]						Current Noncarcinogenic Toxicity Factors for Subchronic Exposures[a,b]					
		RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[c] (unitless)	ABS[d] (unitless)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[c] (unitless)	ABS[d] (unitless)
7440-36-0	Antimony	4.00E-04	8.00E-06	---	---	0.02	0.001	4.00E-04 [e]	6.00E-05	---	---	0.15	---
7440-38-2	Arsenic	3.00E-04	1.23E-04	---	---	0.41	0.001	3.00E-04 [f]	3.00E-04	4.29E-06	1.50E-05 [g]	1	0.03
7440-39-3	Barium	7.00E-02	4.90E-03	1.43E-03	5.00E-03	0.07	0.001	2.00E-01 [h]	1.40E-02	1.43E-03	5.00E-03 [f]	0.07	---
7440-43-9	Cadmium	1.00E-03	---	---	---	0.01	0.01	5.00E-04 [i]	1.25E-05	---	---	0.025	0.001
7440-47-3	Chromium (VI)	2.00E-02	4.00E-04	---	---	0.02	0.001	---	---	---	---	0.025	---
7439-98-7	Molydenum	5.00E-03	1.90E-03	---	---	0.38	0.001	5.00E-03 [f]	5.00E-03	---	---	1	---
7440-02-0	Nickel[j]	2.00E-02	5.40E-03	---	---	0.27	0.001	2.00E-02 [f]	8.00E-04	5.71E-05	2.00E-04 [k]	0.04	---
7782-49-2	Selenium	5.00E-03	2.20E-03	---	---	0.44	0.001	5.00E-03 [f]	5.00E-03	---	---	1	---
7440-28-0	Thallium[l]	8.00E-04	8.00E-04	---	---	0.2	0.001	5.00E-05 [m]	5.00E-05	---	---	1	---
7440-61-1	Uranium	---	---	---	---	0.85	0.001	2.00E-04 [n]	2.00E-04	2.86E-05	1.00E-04 [n]	1	---
7440-62-2	Vanadium	7.00E-03	700E-05	---	---	0.01	0.001	5.04E-03 [o]	1.31E-04	---	---	0.026	---

[a] Subchronic exposures were assumed in the NC FS, as well as in the risk evaluations of health protectiveness in this five-year review for the hypothetical resident child (ages 0 to 6 years), construction workers, utility workers, road workers, and maintenance workers. The dashed line ("---") indicates no toxicity value available.

[b] For current toxicity factors, a gray-shaded cell indicates that for the purpose of determining health protectiveness in this five-year review report, the current toxicty factor is more health-conservative than the corresponding NC FS value. An unshaded cell indicates that the current toxicity factor is the same as or less health-conservative than the corresponding NC FS value.

[c] RfD_d values are calculated from the corresponding RfD_o and GIABS values, per the RAGS Part E (USEPA 2004). GIABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current GIABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[d] ABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current ABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[e] "Zirconium, Niobium, Antimony, Vanadium and Lead in Rats: Life Term Studies" (Schroeder et al. 1970) as cited in the USEPA PPRTV database. The chronic RfD_o for antimony was adopted as the subchronic RfD_o. Tier 2 value.

[f] 1997 HEAST. Tier 3 value.

[g] Chronic value from *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CALEPA 2015) applied. Tier 3 value.

[h] *Toxicological Profile for Barium and Barium Compounds* (ATSDR 2007). Tier 3 value.

[i] *Toxicological Profile for Cadmium* (ATSDR 2012b). Tier 3 value.

[j] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC-contaminated soil at the North St. Louis County Sites.

[k] *Toxicological Profile for Nickel* (ATSDR 2005). Tier 3 value.

[l] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS.

[m] Subchronic RfD_o for thallium is a PPRTV not available through the online PPRTV database, but was obtained through the RAIS (ORNL 2015). Tier 2 value.

[n] *Toxicological Profile for Uranium* (ATSDR 2013). Tier 3 value.

[o] The chronic RfD_o for vanadium is used as a surrogate for the subchronic value. The chronic RfD_o for vanadium was derived from the RfD_o for vanadium pentoxide (Stokinger et al. 1953 as cited in the IRIS database [USEPA 2015b]) by factoring out the molecular weight of the oxide ion. Vanadium pentoxide (V_2O_5) has a molecular weight of 181.88. The two atoms of vanadium contribute 56 percent of the molecular weight; therefore, the RfD_o for vanadium pentoxide of 9E-03 mg/kg-day was multiplied by 56 percent, resulting in a RfD_o for vanadium of 5.04E-03 mg/kg-day. This RfD_o is considered to be a Tier 1 value.

Table VII-11C. Noncarcinogenic Toxicity Factor Updates for Chronic Exposures to Metal Contaminants of Concern at the Latty Avenue and SLAPS Properties and SLAPS VPs

CAS No.	COCs	NC FS Noncarcinogenic Toxicity Factors for Chronic Exposures[a]						Current Noncarcinogenic Toxicity Factors for Chronic Exposures[a,b]					
		RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[c] (unitless)	ABS[d] (unitless)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	RfD_i (mg/kg-day)	RfC (mg/m^3)	GIABS[c] (unitless)	ABS[d] (unitless)
7440-36-0	Antimony	4.00E-04	8.00E-06	---	---	0.02	0.001	4.00E-04 [e]	6.00E-05	---	---	0.15	---
7440-38-2	Arsenic	3.00E-04	1.23E-04	---	---	0.41	0.001	3.00E-04 [f]	3.00E-04	4.29E-06	1.50E-05 [g]	1	0.03
7440-39-3	Barium	7.00E-02	4.90E-03	1.43E-04	5.00E-04	0.07	0.001	2.00E-01 [h]	1.40E-02	1.43E-04	5.00E-04 [i]	0.07	---
7440-43-9	Cadmium	1.00E-03	1.00E-05	---	---	0.01	0.01	1.00E-03 [j]	2.50E-05	---	1.00E-05 [k]	0.025	0.001
7440-47-3	Chromium (VI)	3.00E-03	6.00E-05	2.86E-05	1.00E-04	0.02	0.001	3.00E-03 [l]	7.50E-05	2.86E-05	1.00E-04 [m, n]	0.025	---
7439-98-7	Molydenum	5.00E-03	1.90E-03	---	---	0.38	0.001	5.00E-03 [o]	5.00E-03	---	---	1	---
7440-02-0	Nickel[p]	2.00E-02	5.40E-03	---	---	0.27	0.001	2.00E-02 [q]	8.00E-04	2.57E-05	9.00E-05 [r]	0.04	---
7782-49-2	Selenium	5.00E-03	2.20E-03	---	---	0.44	0.001	5.00E-03 [s]	5.00E-03	---	2.00E-02 [g]	1	---
7440-28-0	Thallium[t]	8.00E-05	8.00E-05	---	---	0.2	0.001	2.00E-05 [u]	2.00E-05	---	---	1	---
7440-61-1	Uranium	3.00E-03	2.55E-03	---	---	0.85	0.001	3.00E-03 [v]	3.00E-03	1.14E-05	4.00E-05 [w]	1	---
7440-62-2	Vanadium	7.00E-03	700E-05	---	---	0.01	0.001	5.04E-03 [x]	1.31E-04	---	---	0.026	---

[a] Chronic exposures were assumed in the NC FS, as well as in the risk evaluations of health protectiveness in this five-year review for the industrial worker, the hypothetical resident adult, and the hypothetical resident (age-adjusted). The dashed line ("---") indicates no toxicity value available.

[b] For current toxicity factors, a gray-shaded cell indicates that for the purpose of determining health protectiveness in this five-year review report, the current toxicty factor is more health-conservative than the corresponding NC FS value. An unshaded cell indicates that the current toxicity factor is the same as or less health-conservative than the corresponding NC FS value.

[c] RfD_d values are calculated from the corresponding RfD_o and GIABS values, per the RAGS Part E (USEPA 2004). GIABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current GIABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[d] ABS values used in the NC FS were presented in Appendix D, Attachment 11, of that document. Current ABS values presented were obtained from the RAGS Part E (USEPA 2004) and are also presented in the RSL tables (USEPA 2015a).

[e] "Zirconium, Niobium, Antimony, Vanadium and Lead in Rats: Life Term Studies" (Schroeder et al. 1970) as cited in the USEPA PPRTV database. Tier 2 value.

[f] "Prevalence of Skin Cancer in an Endemic Area of Chronic Arsenicism in Taiwan" (Tseng et al. 1968) and "Effects and Dose-Response Relationships of Skin Cancer and Blackfoot Disease with Arsenic" (Tseng 1977) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[g] *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CALEPA 2015). Tier 3 value.

[h] *NTP Technical Report on the Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS no. 10326-27-9) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies)* (NTP 1994) as cited in the IRIS database (USEPA 2015b) . Tier 1 value.

[i] 1997 HEAST. Tier 3 value.

[j] *Drinking Water Criteria Document on Cadmium* (USEPA 1985) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[k] *Toxicological Profile for Cadmium* (ATSDR 2012b). Tier 3 value.

[l] "Chronic Toxicity Studies. II. Hexavalent and Trivalent Chromium Administered in Drinking Water to Rats" (MacKenzie et al. 1958) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[m] "Investigation of Irritating Properties of Inhaled Cr(VI) with Possible Influence on Its Carcinogenic Action" (Glaser et al. 1990) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[n] "Estimation of a Chromium Inhalation Reference Concentration Using the Benchmark Dose Method: a Case Study" (Malsch et al. 1994) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[o] "Changes of Purine Metabolism in Man and Animals under Conditions of Molybdenum Biogeochemical Provinces" (Koval'skiy et al. 1961) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[p] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC-contaminated soil at the North St. Louis County Sites.

[q] "Long Term Toxicologic Assessment of Nickel in Rats and Dogs" (Ambrose et al. 1976) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[r] *Toxicological Profile for Nickel* (ATSDR 2005). Tier 3 value

[s] "Studies of Safe Maximal Daily Dietary Se-Intake in a Seleniferous Area in China. Part II. Relation between Se-Intake and the Manifestation of Clinical Signs and Certain Biochemical Alterations in Blood and Urine" (Yang et al. 1989) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[t] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS.

[u] Chronic RfD_o for thallium is a PPRTV not available through the online PPRTV database, but was obtained through the RAIS (ORNL 2015). Tier 2 value.

[v] "Studies of the Toxicity of Various Uranium Compounds when Fed to Experimental Animals" (Maynard and Hodge 1949) as cited in the IRIS database (USEPA 2015b). Tier 1 value.

[w] *Toxicological Profile for Uranium* (ATSDR 2013). Tier 3 value. According to *Toxicological Profile for Uranium* (ATSDR 2013) the chronic RfD_o currently presented in the IRIS database (USEPA 2015b) is under review by the USEPA.

[x] The chronic RfD_o for vanadium was derived from the RfD_o for vanadium pentoxide (Stokinger et al. 1953 as cited in the IRIS database [USEPA 2015b]) by factoring out the molecular weight of the oxide ion. Vanadium pentoxide (V_2O_5) has a molecular weight of 181.88. The two atoms of vanadium contribute 56 percent of the molecular weight; therefore, the RfD_o for vanadium pentoxide of 9E-03 mg/kg-day was multiplied by 56 percent, resulting in a RfD_o for vanadium of 5.04E-03 mg/kg-day. This RfD_o is considered to be a Tier 1 value.

Table VII-12. Radiological Cancer Risk and Dose Comparisons Between PRAR-FSSE Report and Third Five-Year Review Report Evaluations Conducted for VP-53 Soil at the North St. Louis County Sites

Site	Property	Receptor	PRAR-FSSE Report Results[a]		Third Five-Year Review Report Results[b]	
			Risk (Unitless)	Dose (mrem/yr)	Risk (Unitless)	Dose (mrem/yr)
North St. Louis County Site (Latty Avenue)	VP-53	Resident Non-Gardener (Ground Cover Absent)	4E-05	5	4E-05	4

[a] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the associateed PRAR-FSSE report [USACE 2011f]). The following RESRAD model version and CSF and DCF libraries were used in the PRAR-FSSE report documents for VP-53: RESRAD Version 6.5, 2001 HEAST risk library, FGR-11 and FGR-12 dose library.

[b] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the supporting RESRAD plot data presented in Tables F-4-2 and F-4-3). The third five-year review evaluation of DT-10 and VP-53 radiological risk and dose utilized RESRAD Version 7.0, with the DCFPAK 3.02 risk and dose library (adult), which incorporates the 2014 USEPA CSF and ICRP-107 DCF updates, respectively.

Table VII-13. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in HISS Soil at the Latty Avenue Properties

Receptor[a]	Target Organ HIs (Unitless) for the HISS[b]							HISS Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c]									
Industrial Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Construction Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Utility Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Road Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Maintenance Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Recreational User/Trespasser (Ages 6-14 Years)	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Resident	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Subsurface Soil [d]									
Construction Worker	0.3	0.09	0.5	NA	NA	NA	0.2	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.01	0.004	0.02	NA	NA	NA	0.009	6E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.1	0.03	0.2	NA	NA	NA	0.08	5E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.006	0.001	0.008	NA	NA	NA	0.002	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.3	0.09	0.8	NA	NA	NA	0.5	3E-05	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified in subsurface soil at the HISS and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The HISS PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-5 of Appendix F of this five-year review report.

[c] No surface soil data are available for HISS evaluations. Exposures to surface soil at the HISS were not evaluated, because verification sample locations included in the risk evaluation have been backfilled and, therefore, represent subsurface soil conditions. No other surface soil data are available.

[d] Receptor expsosures to following metal COCs were evaluated for subsurface soil: antimony, arsenic, thallium, and uranium.

Notes:

NA - For HISS surface soil, HI and CR calculations are not applicable, because there are no surface soil data. For subsurface soil, "NA" indicates that the target organ HI evaluation is not applicable because the target organ is not affected by subsurface soil COCs.

CNS - central nervous system

Table VII-14. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in Parcel 10K530087 Soil at the Latty Avenue Properties

Receptor[a]	Target Organ HIs (Unitless) for Parcel 10K530087[b]							Parcel 10K530087 Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
***Surface Soil*[c]**									
Industrial Worker	0.09	0.011	0.2	0.0015	0.0002	0.005	0.1	8E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.4	0.05	0.8	0.002	0.002	0.006	0.4	2E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.02	0.002	0.03	0.0001	0.00009	0.0002	0.02	9E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.2	0.02	0.3	0.0009	0.0008	0.002	0.1	8E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.04	0.005	0.08	0.0005	0.0002	0.0006	0.04	2E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.01	0.0009	0.03	0.00007	0.00004	0.00007	0.02	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.4	0.04	**1.3**	0.002	0.002	0.003	0.9	5E-05	Skin HI exceeds the target of 1 due to thallium and arsenic. Individual HIs for thallium (0.91) and arsenic (35) are each less than 1, with the thallium HI being driven by the presence of an elevated detection limit at location SVP103877. Total CR is less than 1E-04.
***Subsurface Soil*[d]**									
Construction Worker	0.2	0.02	0.4	NA	NA	NA	0.2	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.008	0.0006	0.02	NA	NA	NA	0.008	5E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.08	0.006	0.1	NA	NA	NA	0.07	4E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.004	0.0002	0.006	NA	NA	NA	0.002	8E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.2	0.02	0.6	NA	NA	NA	0.5	3E-05	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified each in surface and subsurface soil at Parcel 10K530087 and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The Parcel 10K530087 PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-5 of Appendix F of this five-year review report.

[c] Receptor exposures to the following metal COCs were evaluated for surface soil: antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium.

[d] Receptor expsosures to following metal COCs were evaluated for subsurface soil: antimony, arsenic, thallium, and uranium.

Notes:

NA - For subsurface soil, the target organ HI evaluation is not applicable because the target organ is not affected by subsurface soil COCs.

Gray-shaded bold values exceed the USEPA's target HI of 1.

Table VII-15. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in VP-02(L) Soil at the Latty Avenue Properties

Receptor[a]	Target Organ HIs (Unitless) for VP-02(L)[b]							VP-02(L) Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c]									
Industrial Worker	0.09	0.06	0.2	0.007	0.0003	0.005	0.1	3E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.6	0.5	0.7	0.01	0.003	0.005	0.5	8E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.02	0.02	0.03	0.0005	0.0001	0.0002	0.02	3E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.2	0.2	0.2	0.004	0.001	0.002	0.2	3E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.06	0.06	0.07	0.002	0.0003	0.0005	0.06	5E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.01	0.01	0.03	0.0003	0.00006	0.00007	0.03	2E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.6	0.5	**1.4**	0.01	0.003	0.003	**1.3**	2E-05	Skin and CNS HIs exceed 1 due to thallium. All surface soil results for thallium are non-detects. Total CR is less than 1E-04.
Subsurface Soil [d]									
Construction Worker	0.4	0.3	0.8	NA	NA	NA	0.6	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.02	0.01	0.03	NA	NA	NA	0.02	4E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.2	0.1	0.3	NA	NA	NA	0.2	3E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.007	0.003	0.01	NA	NA	NA	0.007	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.4	0.3	**1.6**	NA	NA	NA	**1.5**	2E-05	Skin and CNS HIs exceed 1 due to thallium. For thallium, 15 out of 16 subsurface soil results are non-detects, with the CNS HI being driven by several elevated detection limits. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified each in surface and subsurface soil at VP-02(L) and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The VP-02(L) PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-5 of Appendix F of this five-year review report.

[c] Receptor exposures to the following metal COCs were evaluated for surface soil: antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium.

[d] Receptor expsosures to following metal COCs were evaluated for subsurface soil: antimony, arsenic, thallium, and uranium.

Notes:

NA - For subsurface soil, the target organ HI evaluation is not applicable because the target organ is not affected by subsurface soil COCs.

Gray-shaded bold values exceed the USEPA's target HI of 1.

Table VII-16. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in Futura Soil at the Latty Avenue Properties

Receptor[a]	Target Organ HIs (Unitless) for Futura[b]							Futura Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c]									
Industrial Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Construction Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Utility Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Road Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Maintenance Worker	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Recreational User/Trespasser (Ages 6-14 Years)	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Resident	NA	NA	NA	NA	NA	NA	NA	NA	No surface soil samples evaluated.
Subsurface Soil [d]									
Construction Worker	0.2	0.06	0.5	NA	NA	NA	0.4	9E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.009	0.003	0.02	NA	NA	NA	0.01	4E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.08	0.02	0.2	NA	NA	NA	0.1	3E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.004	0.0007	0.008	NA	NA	NA	0.004	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.2	0.06	**1.0**	NA	NA	NA	0.9	2E-05	Skin HI slightly exceeds 1 (HI = 1.1) due to thallium and arsenic. Individual HIs for thallium (0.87) and arsenic (0.14) are each less than 1, with thallium being the predominant contributor. For thallium, 9 out of 11 sample results are non-detects, with the skin HI being driven by an elevated detection limit at location SVP125643. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified in subsurface soil at the Futura property and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The Futura PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-5 of Appendix F of this five-year review report.

[c] No surface soil data are available for Futura evaluations. Exposures to surface soil at the Futura property were not evaluated, because verification sample locations included in the risk evaluation have been backfilled and therefore, represent subsurface soil conditions. No other surface soil data are available.

[d] Receptor expsosures to following metal COCs were evaluated for subsurface soil: antimony, arsenic, thallium, and uranium.

Notes:

NA - For Futura surface soil, HI and CR calculations are not applicable, because there are no surface soil data. For subsurface soil, "NA" indicates that the target organ HI evaluation is not applicable because the target organ is not affected by subsurface soil COCs.

Gray-shaded bold values exceed the USEPA's target HI of 1.

Table VII-17. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in Soil at the Combined Latty Avenue Properties (HISS, Parcel 10K530087, VP-02[L], and Futura Property)

Receptor[a]	Target Organ HIs (Unitless) for the Latty Avenue Properties[b]							Latty Avenue Properties Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c]									
Industrial Worker	0.1	0.03	0.2	0.0025	0.0002	0.004	0.1	8E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.6	0.2	0.8	0.004	0.002	0.005	0.4	2E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.02	0.007	0.03	0.0002	0.00008	0.0002	0.02	9E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.2	0.07	0.30	0.001	0.0007	0.002	0.2	8E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.06	0.02	0.08	0.0008	0.0002	0.0005	0.04	2E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.01	0.004	0.03	0.0001	0.00004	0.00007	0.02	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.5	0.2	**1.3**	0.004	0.002	0.003	0.99	5E-05	Skin HI exceeds the target of 1 due to thallium and arsenic. Individual HIs for thallium (0.99) and arsenic (0.35) are each less than 1, with thallium being the predominant contributor. The thallium HI is being driven by elevated detection limits at Parcel 10K530087 and VP-02(L). Total CR is less than 1E-04.
Subsurface Soil									
Construction Worker	0.3	0.1	0.5	NA	NA	NA	0.3	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.01	0.004	0.02	NA	NA	NA	0.01	4E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.1	0.04	0.2	NA	NA	NA	0.1	3E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.005	0.001	0.007	NA	NA	NA	0.003	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.2	0.1	0.9	NA	NA	NA	0.7	2E-05	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified in subsurface soil at the HISS, Parcel 10K530087, VP-02(L), and Futura properties and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). EPCs were calculated by combining all four properties and applying equal weighting to sample locations across all properties.

[c] No surface soil data are available for the HISS or Futura. Exposures to surface soil at the HISS and Futura were not evaluated, because verification sample locations included in the risk evaluation have been backfilled and, therefore, represent subsurface soil conditions. No other surface soil data are available.

Notes:

NA - For subsurface soil, "NA" indicates that the target organ HI evaluation is not applicable because the target organ is not affected by subsurface soil COCs.

Gray-shaded bold values exceed the USEPA's target HI of 1.

Table VII-18. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in Soil at the SLAPS

Receptor[a]	Target Organ HIs (Unitless) Estimated for the SLAPS[b]							SLAPS Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c,e]									
Industrial Worker	0.01	0.04	0.04	0.03	0.0002	0.006	0.04	3E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.02	0.08	0.1	0.3	0.002	0.007	0.1	6E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.0008	0.003	0.006	0.01	0.00007	0.0003	0.006	3E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.007	0.03	0.05	0.1	0.0006	0.003	0.05	2E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.002	0.01	0.01	0.04	0.0002	0.0008	0.01	4E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.0004	0.002	0.007	0.001	0.00003	0.00009	0.007	1E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.02	0.09	0.3	0.05	0.002	0.004	0.3	6E-05	All target organ HIs less than 1. Total CR is less than 1E-04.
Subsurface Soil [d,e]									
Construction Worker	0.01	0.01	0.1	0.3	NA	NA	0.1	NA	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.0006	0.0006	0.006	0.01	NA	NA	0.006	NA	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.005	0.005	0.05	0.1	NA	NA	0.05	NA	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.0002	0.0002	0.002	0.004	NA	NA	0.002	NA	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.01	0.01	0.3	0.02	NA	NA	0.3	NA	All target organ HIs less than 1. Total CR is less than 1E-04.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified each in surface and subsurface soil at the SLAPS and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The SLAPS PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-6 of Appendix F of this five-year review report.

[c] Receptor exposures to the following metal COCs were evaluated for surface soil: antimony, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium.

[d] Receptor exposures to the following metal COCs were evaluated for subsurface soil: antimony, arsenic, thallium, and uranium.

[e] Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the risk evaluations for this five-year review report .

Notes:

NA - For the target organ HI analysis, the target organ is not applicable to the subsurface soil COCs evaluated. For the evaluation of CRs, no carcincogenic COCs are applicable.

Table VII-19. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in IA-13 Soil at the SLAPS VPs

Receptor[a]	Target Organ HIs (Unitless) Estimated for IA-13[b]							IA-13 Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c,e]									
Industrial Worker	0.008	0.01	0.01	0.01	0.0001	0.005	0.01	2E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.008	0.03	0.04	0.2	0.001	0.006	0.04	5E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.0003	0.001	0.002	0.01	0.00005	0.0002	0.002	2E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.003	0.01	0.02	0.08	0.0004	0.002	0.02	2E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.0008	0.003	0.004	0.02	0.0001	0.0006	0.004	3E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.0001	0.001	0.002	0.0003	0.00002	0.0001	0.002	3E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.007	0.05	0.1	0.01	0.001	0.004	0.1	5E-05	All target organ HIs less than 1. Total CR is less than 1E-04.
Subsurface Soil [d,e]									
Construction Worker	0.05	0.05	0.1	0.2	NA	NA	0.1	NA	All target organ HIs less than 1.
Utility Worker	0.002	0.002	0.005	0.01	NA	NA	0.005	NA	All target organ HIs less than 1.
Road Worker	0.02	0.02	0.04	0.09	NA	NA	0.04	NA	All target organ HIs less than 1.
Maintenance Worker	0.0005	0.0005	0.001	0.003	NA	NA	0.001	NA	All target organ HIs less than 1.
Resident	0.04	0.04	0.3	0.02	NA	NA	0.3	NA	All target organ HIs less than 1.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified each in surface and subsurface soil at IA-13 and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The IA-13 PRAR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-6 of Appendix F of this five-year review report.

[c] Receptor exposures to the following metal COCs were evaluated for surface soil: antimony, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium.

[d] Receptor exposures to the following metal COCs were evaluated for subsurface soil: antimony, thallium, and uranium.

[e] Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper*, *FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Notes:

NA - For the target organ HI analysis, the target organ is not applicable to the subsurface soil COCs evaluated. For the evaluation of CRs, no carcinogenic COCs are applicable.

Table VII-20. Noncancer Hazard Indices and Potential Cancer Risks for Metal Contaminants of Concern in IA-11 Soil at the SLAPS VPs

Receptor[a]	Target Organ HIs (Unitless) Estimated for IA-11[b]							IA-11 Total CR[b] (Unitless)	Comments
	Cardiovascular HI	Respiratory HI	Skin HI	Kidney HI	Skeletal HI	Immune HI	CNS HI		
Surface Soil [c]									
Industrial Worker	0.03	0.01	0.06	0.005	0.0001	0.004	0.04	4E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Construction Worker	0.1	0.03	0.2	0.1	0.001	0.004	0.1	1E-06	All target organ HIs less than 1. Total CR is less than 1E-04.
Utility Worker	0.005	0.001	0.01	0.005	0.00005	0.0002	0.006	4E-08	All target organ HIs less than 1. Total CR is less than 1E-04.
Road Worker	0.04	0.01	0.09	0.05	0.0004	0.002	0.05	4E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Maintenance Worker	0.01	0.003	0.03	0.01	0.0001	0.0005	0.01	7E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Recreational User/Trespasser (Ages 6-14 Years)	0.003	0.0009	0.009	0.0002	0.00002	0.00006	0.007	2E-07	All target organ HIs less than 1. Total CR is less than 1E-04.
Resident	0.1	0.04	0.4	0.009	0.001	0.003	0.3	5E-05	All target organ HIs less than 1. Total CR is less than 1E-04.
Subsurface Soil [d]									
Construction Worker	0.2	0.007	0.3	0.1	NA	NA	0.1	9E-07	All target organ HIs less than 1.
Utility Worker	0.006	0.0003	0.01	0.005	NA	NA	0.006	3E-08	All target organ HIs less than 1.
Road Worker	0.06	0.003	0.1	0.04	NA	NA	0.05	3E-07	All target organ HIs less than 1.
Maintenance Worker	0.003	0.00008	0.005	0.001	NA	NA	0.002	6E-07	All target organ HIs less than 1.
Resident	0.1	0.007	0.5	0.007	NA	NA	0.3	2E-05	All target organ HIs less than 1.

[a] Receptors evaluated include those scenarios presented in the NC FS, Appendix D (USACE 2003a), as well as all receptors considered for risk evaluations conducted in North St. Louis County Sites PRAR-FSSE reports. Protection of the construction worker and age-adjusted resident (i.e., receptor names presented in **bold font**) from adverse, systemic (noncancer) effects was used as the basis for determining soil RGs in the NC FS. The industrial worker and recreational user/trespasser were evaluated for only surface soil exposures, per the NC FS. The maintenance worker was evaluated for surface and subsurface soil exposures, even though the NC FS indicates that only surface soil exposure pathways are complete. The utility and road worker receptors were not evaluated in the NC FS; however, these receptors have been evaluated as part of post-remedial actions at the North St. Louis County Sites for surface and subsurface soil exposures, so they are evaluated in this five-year review. The child resident, adult resident, and age-adjusted resident were evaluated for surface and subsurface soil exposures, though the metal RGs were derived for protection of the age-adjusted resident.

[b] The HIs and CRs presented were estimated over all metal COCs identified each in surface and subsurface soil at IA-11 and include all exposure routes (i.e., soil ingestion, dermal contact with soil and dust inhalation). The IA-11 PDIR-FSSE report EPCs were applied as the source term in the calculations. Exposure and toxicity factors used for estimating the above HIs and CRs are presented in Tables VII-10, VII-11A, VII-11B, and VII-11C, which include both the NC FS (USACE 2003a) and current input values. Spreadsheets showing risk calculations are presented in Attachment F-6 of Appendix F of this five-year review report.

[c] Receptor exposures to the following metal COCs were evaluated for surface soil: antimony, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium.

[d] Receptor exposures to the following metal COCs were evaluated for subsurface soil: antimony, thallium, and uranium.

Notes:

NA - For the target organ HI analysis, the target organ is not applicable to the subsurface soil COCs evaluated.

VIII. ISSUES

ST. LOUIS DOWNTOWN SITE

One issue that could potentially affect protectiveness was identified for the SLDS: Concentrations of arsenic and total U in HU-B ground water have exceeded the ILs. This issue is summarized in Table VIII-1.

Table VIII-1. SLDS Issue

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Exceedance of the ILs in HU-B Ground Water The GRAAA was initiated in 2002, following significant exceedance of the total U IL in DW19 for an extended period. The phases of the GRAAA consist of assessment (Phase 1), investigation (Phase 2), feasibility (Phase 3), and proposed remediation (Phase 4). Phase 1 of the GRAAA was completed in 2003. Based on the results of the Phase 1 GRAAA and the continued exceedance of the ILs for arsenic and total U in the HU-B ground-water samples, there is a need to proceed with Phase 2 of the GRAAA. Phase 2 of the GRAAA has not yet been initiated, because remediation of the potential sources of the elevated COC concentrations detected in HU-B ground water, such as contaminated soil located beneath Building 101, has not yet been completed. The potential sources are being addressed by the ongoing remediation at Plant 6WH. Phase 2 will be initiated following completion of remedial activities at Plant 6WH and will be discussed in a subsequent five-year review.	No. The potential for direct human contact with contaminated ground water is limited. Ground water is not currently used as a drinking-water source and the existing access controls (such as the perimeter fence and site security) limit potential exposures to contaminated ground water.	Yes. Although the future use of HU-B as a ground-water source is unlikely, it qualifies as a potential source of drinking water under the USEPA's ground-water classification system. The average concentration of total U in DW19 ground-water samples was lower during this five-year review period than during the previous review period, likely due to the ongoing remediation of potential sources beneath the Building 101 area. However, total U and arsenic concentrations in HU-B ground water continue to exceed the ILs. The USACE will continue to monitor HU-B for a period of at least 2 years after remedial activities have been completed, and after that time the DOE will conduct long-term monitoring. Monitoring will help ensure that the SLDS ROD RAO to "continue to maintain low concentrations of OU COCs in the B Unit" (USACE 1998a) is being achieved.

NORTH ST. LOUIS COUNTY SITES

One issue that could potentially affect protectiveness was identified for the North St. Louis County Sites: The total U concentrations detected in shallow ground-water monitoring wells at the SLAPS are above the NC ROD monitoring guideline of 30 µg/L. This issue is summarized in Table VIII-2.

Table VIII-2. North St. Louis County Sites Issue

Issue	Currently Affects Protectiveness (Y/N)	Potentially Affects Future Protectiveness (Y/N)
Total U concentrations in shallow ground-water monitoring wells exceed the NC ROD monitoring guideline at the SLAPS: Ground-water monitoring results indicate that total U consistently exceeds the 30 µg/L monitoring guideline established in the NC ROD in shallow (HZ-A) ground water at the western edge of the SLAPS. The high levels of total U were detected in a well that is close enough to potentially impact CWC (i.e., monitoring well PW46). A significantly degraded ground-water condition requires all of the following: 1. that soil COC concentrations have statistically increased in ground water (relative to the well's historic data and accounting for uncertainty) for more than a 12-month period. Significantly increased concentrations are defined as doubling of an individual COC concentration above the upper confidence limit of the mean (based on the historical concentration before remedial action) for a period of 12 months; 2. that the degraded well is close enough to impact CWC; and 3. that a significant degrading of CWC surface water is anticipated. A significant degrading of CWC surface water has not been detected. In addition, although the concentration of total U in PW46 is above the NC ROD guideline, it is below levels previously detected in this area and is anticipated to decrease over time.	No. The ground water and surface water are not current sources of drinking water. In addition, semi-annual monitoring of surface water and sediments in CWC indicate that significant transport of total U from HZ-A into CWC is not occurring.	Yes. Based on a statistical evaluation of the total U concentration trend in PW46, no increases in the concentrations of total U have occurred in PW46 since the previous review period. However, if ground-water monitoring detects a statistically significant increasing trend in total U concentrations in the future, ground-water quality could begin to negatively impact the surface-water quality of adjacent CWC.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations/Follow-Up Actions	Lead Agency	Stakeholder Agencies	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Exceedance of the ILs in HU-B Ground Water at the SLDS	If circumstances warrant, the USACE will initiate Phase 2 of the GRAAA to evaluate the fate and transport of MED/AEC COCs in ground water at the completion of remediation activities at Plant 6. In addition, the USACE will continue monitoring the Mississippi Alluvial Aquifer (HU-B) to monitor the effectiveness of the source removal action.	USACE	USEPA DOE MDNR	Phase 2 would be initiated prior to end of next five-year review period (CY 2018), pending completion of Plant 6 remediation. Monitoring of HU-B is ongoing.	N	Y
Total U concentrations in shallow ground water at the SLAPS exceed the NC ROD monitoring guidelines	The USACE will continue to monitor ground water, surface water, and sediment to ensure that the elevated total U concentrations in shallow ground water do not impact CWC. In addition, the USACE will evaluate the condition of monitoring well PW46 located at the western edge of the SLAPS to determine if well decommissioning and replacement is necessary.	USACE	USEPA DOE MDNR	Monitoring and evaluation are ongoing. Status of PW46 will be determined prior to end of next five-year review period (CY 2018).	N	Y
Landowners/tenants excavation of soils on unremediated properties	The USACE will continue notification letters to property owners and tenants to inform them of contaminated areas.	USACE	USEPA DOE MDNR	Ongoing	N	N
CIP	The final CIP (Revision 0) (USACE 2015) was issued in May 2015.	USACE	USEPA DOE MDNR	CY 2015	N	N

Issue	Recommendations/Follow-Up Actions	Lead Agency	Stakeholder Agencies	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
PDI Report for CWC Reach A	The PDI Work Plan for the portion of Reach A extending from McDonnell Boulevard to Frost Avenue, titled *Pre-Design Investigation Work Plan Coldwater Creek: Northwest of Investigation Area-09 and Investigation Area-10 St. Louis Airport Site Vicinity Properties FUSRAP North St. Louis County Sites*, was issued in November 2012 (USACE 2012j). PDI sampling was conducted within CWC from McDonnell Boulevard to Frost Avenue in CY 2012 and CY 2013. On March 31, 2014, the USACE issued a PDI report for the portion of CWC Reach A extending from the McDonnell Boulevard bridge to Frost Avenue. The report is titled *Pre-Design Investigation Summary Report for Coldwater Creek from McDonnell Boulevard to Frost Avenue* (USACE 2014f). In February 2014, the *Pre-Design Investigation Work Plan for Coldwater Creek from Frost Avenue to St. Denis Bridge*, which covers the remainder of CWC Reach A, as well as Reach B and a portion of Reach C, was issued (USACE 2014g). PDI sampling in this portion of CWC is ongoing. The USACE anticipates that this sampling effort will be completed in CY 2015, and the PDI report for that portion of CWC will be completed in CY 2016.	USACE	USEPA DOE MDNR	CY 2016	N	N

X. PROTECTIVENESS STATEMENT

Protectiveness Statement (St. Louis Downtown Site)

Pursuant to USEPA guidance, the USACE, in coordination with the USEPA, has completed the third five-year review for the St. Louis FUSRAP Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use. This review evaluates the protectiveness of the SLDS Accessible Soil and Ground-Water OU remedy.

The remedial action of the SLDS Accessible Soil and Ground-Water OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the SLDS Accessible Soil and Ground-Water OU may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of SLDS workers and other potential exposure groups. Therefore, the remedy at the SLDS Accessible Soil and Ground-Water OU is expected to be protective of human health and the environment upon completion.

Protectiveness Statement (North St. Louis County Sites)

Pursuant to USEPA guidance, the USACE, in coordination with the USEPA, has completed the third five-year review for the St. Louis FUSRAP Sites. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for UUUE. This review evaluates the protectiveness of the North St. Louis County Sites OU remedy.

The remedial action of the North St. Louis County Sites OU is under construction and is not yet completed. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

The review indicates that while conditions at the North St. Louis County Sites may be protective, conditions could be improved with relatively minor effort, consistent with the recommendations in this review, to ensure the safety and health of North St. Louis County Sites workers and other potential exposure groups. Therefore, the remedy at the North St. Louis County Sites OU is expected to be protective of human health and the environment upon completion.

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XI. NEXT REVIEW

The next five-year review for the North St. Louis County Sites and the SLDS is required 5 years from the signature date of this review.

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FIGURES

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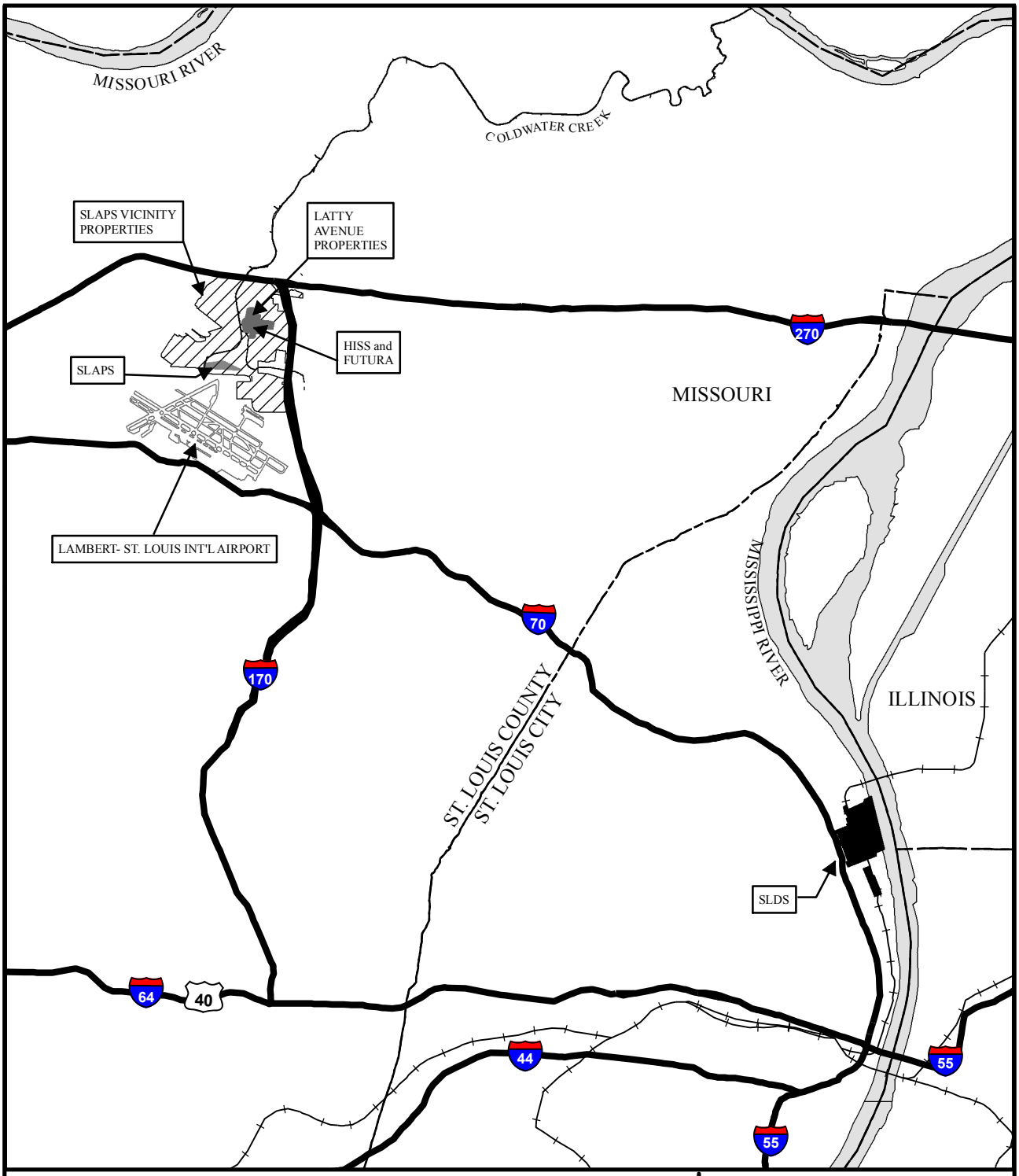

LEGEND:

- Interstate
- US Highway
- Railroad
- North St. Louis County Sites
- Airfield
- SLDS
- SLAPS & HISS/Futura
- River/Stream

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MO-East State Plane
(NAD 83, Feet)

0 5,000 10,000 Feet

Figure III-1.
Location Map of the
St. Louis Sites

FUSRAP

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Path: U:\GPS\NorthCo\Five Year Review\Projects\2014\Rev 0\Figure III-1 Location Map of the St Louis Sites.mxd

Path: U:\GPS\SLDS\Five Year Review\Projects\2014\Rev0\Figure III-2 Plan View of the SLDS.mxd

LEGEND

- Railroad
- Fence
- ROD Boundary
- Property Boundary
- Mallinckrodt Property
- River/Stream
- Road
- Building
- Tank

MO-East State Plane
(NAD 83, Feet)

0 320 640 Feet

Figure III-2. Plan View of the SLDS

FUSRAP

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Unit Designation	Approximate Thickness (ft)	Description
Upper Hydrostratigraphic Unit (HU-A)	0-25	**RUBBLE and FILL** Grayish black (N2) to brownish black (5YR2/1). Dry to slightly moist, generally becoming moist at 5-6 ft and saturated at 10-12 ft. Slight cohesion, variable with depth, moisture content and percentage of fines present. Consistency of relative density is unrepresentative due to large rubble fragments. Rubble is concrete, brick, glass, and coal slag. Percentage of fines as silt or clay increases with depth from 5 to 30 percent. Some weakly cemented aggregations of soil particles. Adhesion of fines to rubble increases with depth and higher moisture content. Degree of compaction is slight to moderate with frequent large voids.
	0-10	**Silty CLAY (CH)** Layers are mostly olive gray (5Y2/1), with some olive black (5Y2/1). Predominantly occurs at contact of undisturbed material, or at boundary of material with elevated activity. Abundant dark, decomposed organics. Variable percentages of silt and clay composition.
	0-5	**CLAY (CL)** Layers are light olive gray (5Y5/2), or dark greenish gray (5GY4/1). Slightly moist to moist, moderate cohesion, medium stiff consistency. Tends to have lowest moisture content. Slight to moderate plasticity.
	0-2.5	**Interbedded CLAY, silty CLAY, SILT and Sandy SILT (CL, ML, SM)** Dark greenish gray (5GY4/1) to light olive gray (5Y6/1). Moist to saturated, dependent on percentage of particle size. Contacts are sharp, with structure normal to sampler axis to less than 15 degrees downdip. Layer thicknesses are variable, random in alternation with no predictable vertical gradation or lateral continuity. Some very fine-grained, rounded silica sand as stringers. Silt in dark mafic, biotite flakes. Some decomposed organics.
Lower Hydrostratigraphic Unit (HU-B)	0-10	**Sandy SILT (ML)** Olive gray (5Y4/1). Moist with zones of higher sand content saturated. Slight to moderate cohesion, moderate compaction. Stiff to very stiff consistency, rapid dilatancy, nonplastic. Sand is well sorted, very fine and fine-grained rounded quartz particles.
	0-50	**Silty SAND and SAND (SM, SP, SW)** Olive gray (5Y4/1). Saturated, slight cohesion, becoming noncohesive with decrease of silt particles with depth. Dense, moderate compaction. Moderate to well-graded, mostly fine- and medium-grained, with some fine- and coarse-grained particles. Mostly rounded with coarse grains slightly subrounded. Gradual gradation from upper unit, silty sand has abundant dark mafic/biotite flakes. Sand is well-graded, fine gravel to fine sand. Mostly medium-grained, with some fine-grained and few coarse-grained and fine gravel.
Limestone Bedrock Unit (HU-C)	Total thickness not penetrated during drilling	**LIMESTONE** Light olive gray (5Y4/1) with interbedded chert nodules. Generally hard to very hard; difficult to scratch with knife. Slightly weathered, moderately fresh with little to no discoloration or staining. Top 5 ft is moderately fractured, with 99 percent of joints normal to the core axis. Joints are open, planar, and smooth. Some are slightly discolored with trace of hematite staining.

SOURCE: MODIFIED FROM DOE 1994.
NOTE: THE CODES IN PARENTHESES FOLLOWING THE LITHOLOGIES ARE THE UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) CODES.

THE CODES IN PARENTHESES FOLLOWING THE COLORS REPRESENT CHROMA, HUE, AND VALUE FROM THE MUNSELL SOIL COLOR CHARTS.

NOT TO SCALE

FUSRAP

Figure III-3. Generalized Stratigraphic Column for the SLDS

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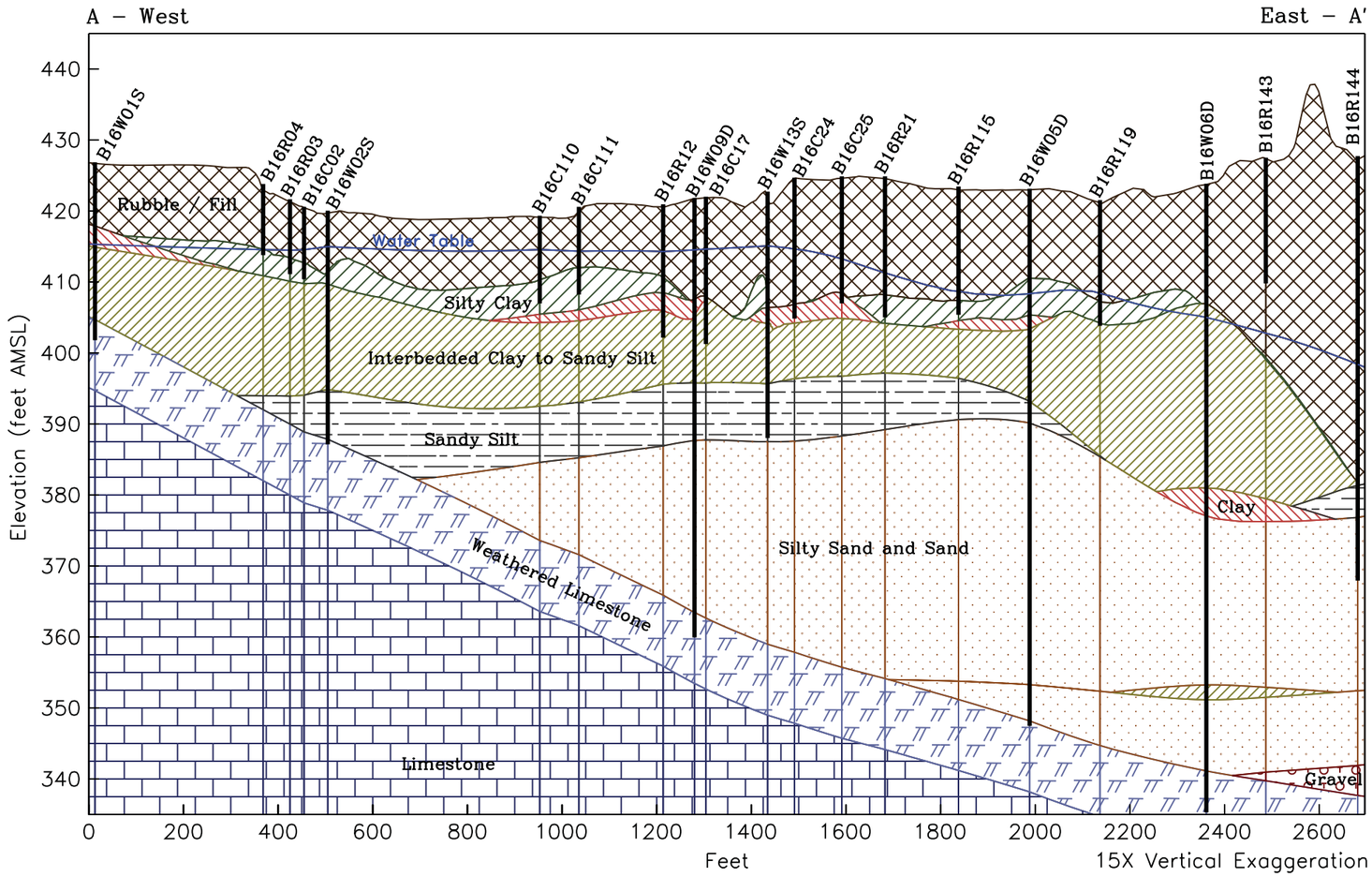

Geologic data used in the cross section collected prior to 1998.

Cross Section Location Map

FUSRAP

Third Five-Year Review
Report for Formerly Utilized Sites
Remedial Action Program
(FUSRAP) St. Louis Sites

Drawn By: R. Smith

Rev. No. - Date: 0 - 03/24/99 rev01/15/15

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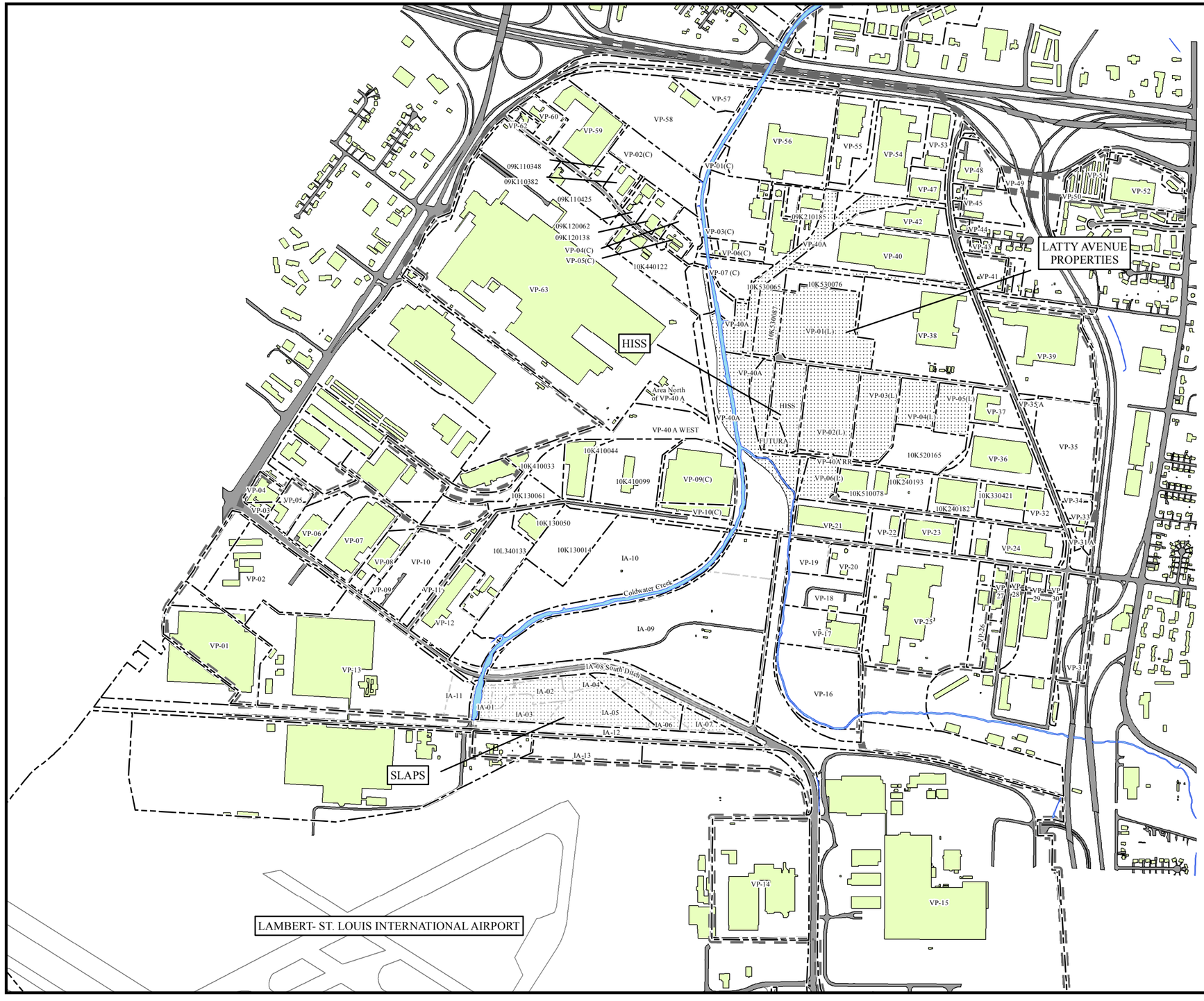
Figure III-4. SLDS Geologic Cross-Section A-A'



LEGEND:

- Road
- Parcel Boundary
- Airfield
- Investigation Areas
- River/Stream
- Buildings
- ROD Boundary
- General Location of SLAPS and Latty Avenue Properties

N
W E
S

MO-East State Plane
(NAD 83, Feet)

0 620 1,240 Feet

Figure III-5
North St. Louis
County Sites Map

FUSRAP

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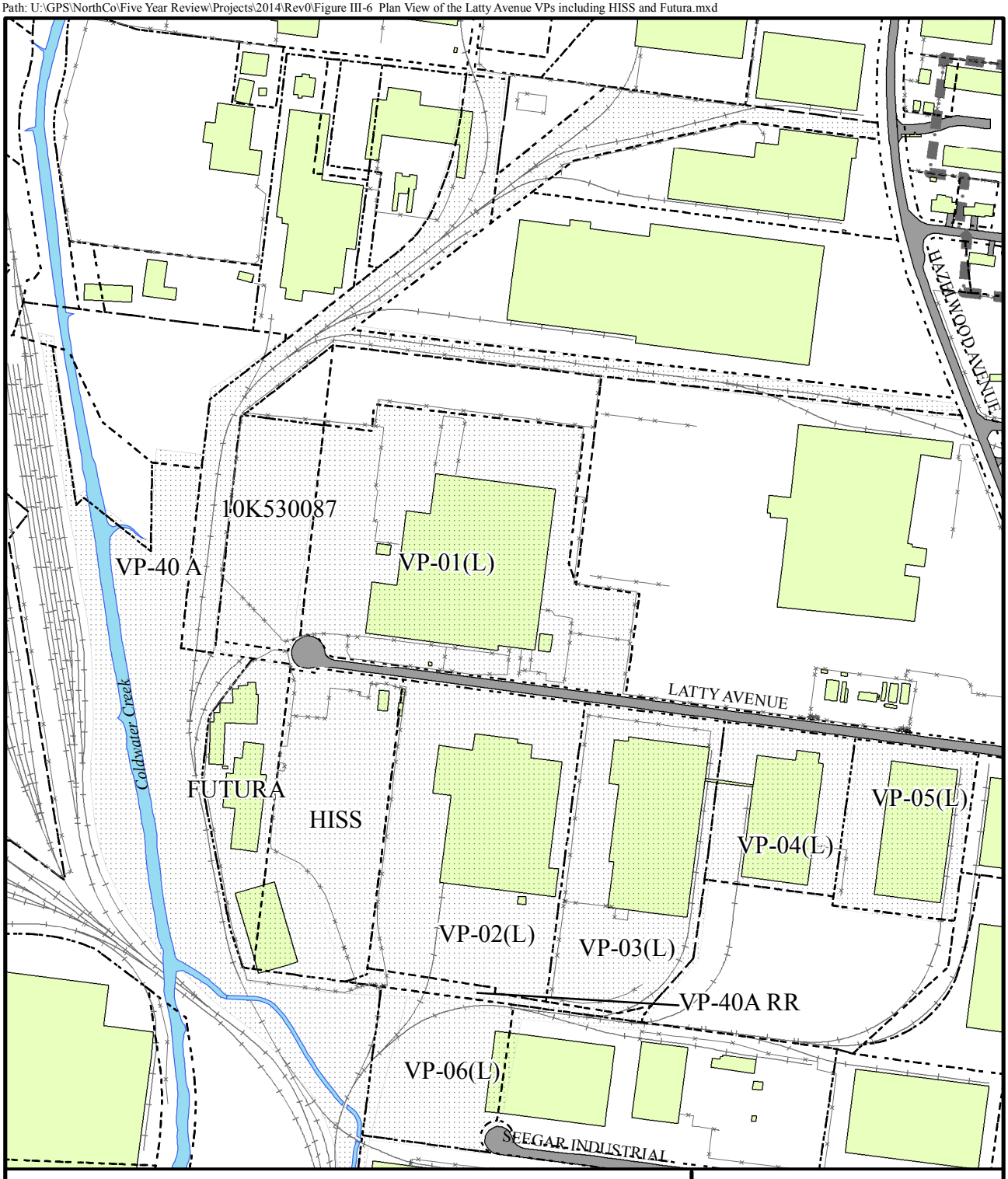
Leidos	0	3/25/2015

Path: U:\GPS\NorthCo\Five Year Review\Projects\2014\Rev0\Figure III-6 Plan View of the Latty Avenue VPs including HISS and Futura.mxd



LEGEND:

- Parcel Boundary
- Latty Avenue Properties
- Buildings
- Road
- River/Stream
- ROD Boundary
- Fence
- Railroad

N W E S

MO-East State Plane
(NAD 83, Feet)

0 290 580 Feet

Figure III-6. Location of the Latty Avenue Properties including HISS and Futura

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TDC	0	5/15/2014

Zone	Period	Epoch	Stratigraphy	Thickness (ft.)	Description
Hydrostratigraphic zone (HZ)-A	Quaternary	Holocene	FILL/TOPSOIL	0-14	**UNIT 1** Fill - Sand, silt, clay, concrete, rubble. Topsoil - Organic silts, clayey silts, wood, fine sand.
		Pleistocene	LOESS (CLAYEY SILT)	11-32	**UNIT 2** Clayey silts, fine sands, commonly mottled with iron oxide staining. Scattered roots and organic material, and a few fossils.
			GLACIOLACUSTRINE SERIES: SILTY CLAY	19-75 (3) 9-27 (3T)	**UNIT 3** Silty clay with scattered organic blebs and peat stringers. Moderate plasticity. Moist to saturated (3T).
Hydrostratigraphic zone (HZ)-B			VARVED CLAY	0-8	Alternating layers of dark and light clay as much as 1/16 inch thick (3M).
			CLAY	0-26	Dense, stiff, moist, highly plastic clay (3M).
Hydrostratigraphic zone (HZ)-C			SILTY CLAY	10-29	Similar to upper silty clay. Probable unconformable contact with highly plastic clay (3B).
			BASAL CLAYEY AND SANDY GRAVEL	0-6	**UNIT 4** Glacial clayey gravels, sands, and sandy gravels. Mostly chert.
Hydrostratigraphic zone (HZ)-D	Pennsylvanian		CHEROKEE (?) GROUP (UNDIFFERENTIATED)	0-35	**UNIT 5** BEDROCK: Interbedded silty clay/shale, lignite/coal, sandstone, and siltstone. Erosionally truncated by glaciolacustrine sequences. (Absent at the HISS).
Hydrostratigraphic zone (HZ)-E	Mississippian		STE. GENEVIEVE ST. LOUIS LIMESTONES	10+	**UNIT 6** BEDROCK: Hard, white to olive, well cemented, sandy limestone with interbedded shale laminations.

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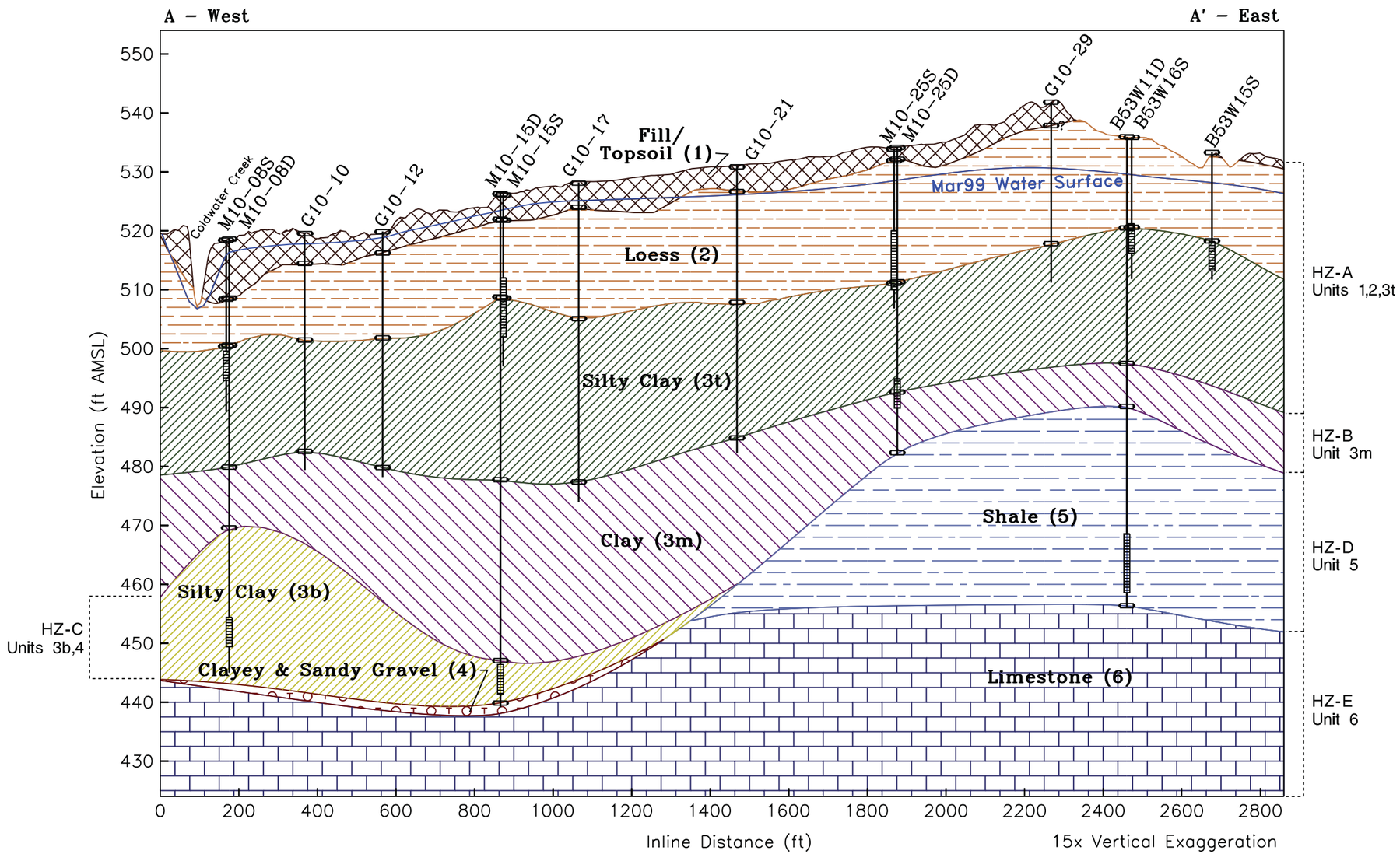
Figure III-7. Generalized Stratigraphic Column for the North St. Louis County Sites

DRAWN BY: C.Kaple	REV. NO./DATE: 1 - 04/01/04	FILE:	NOT TO SCALE



Notes

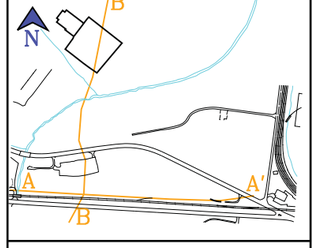
Geologic data used in the cross section collected through 2000.

Legend

Borehole pick

Well screen

Cross Section Location Map



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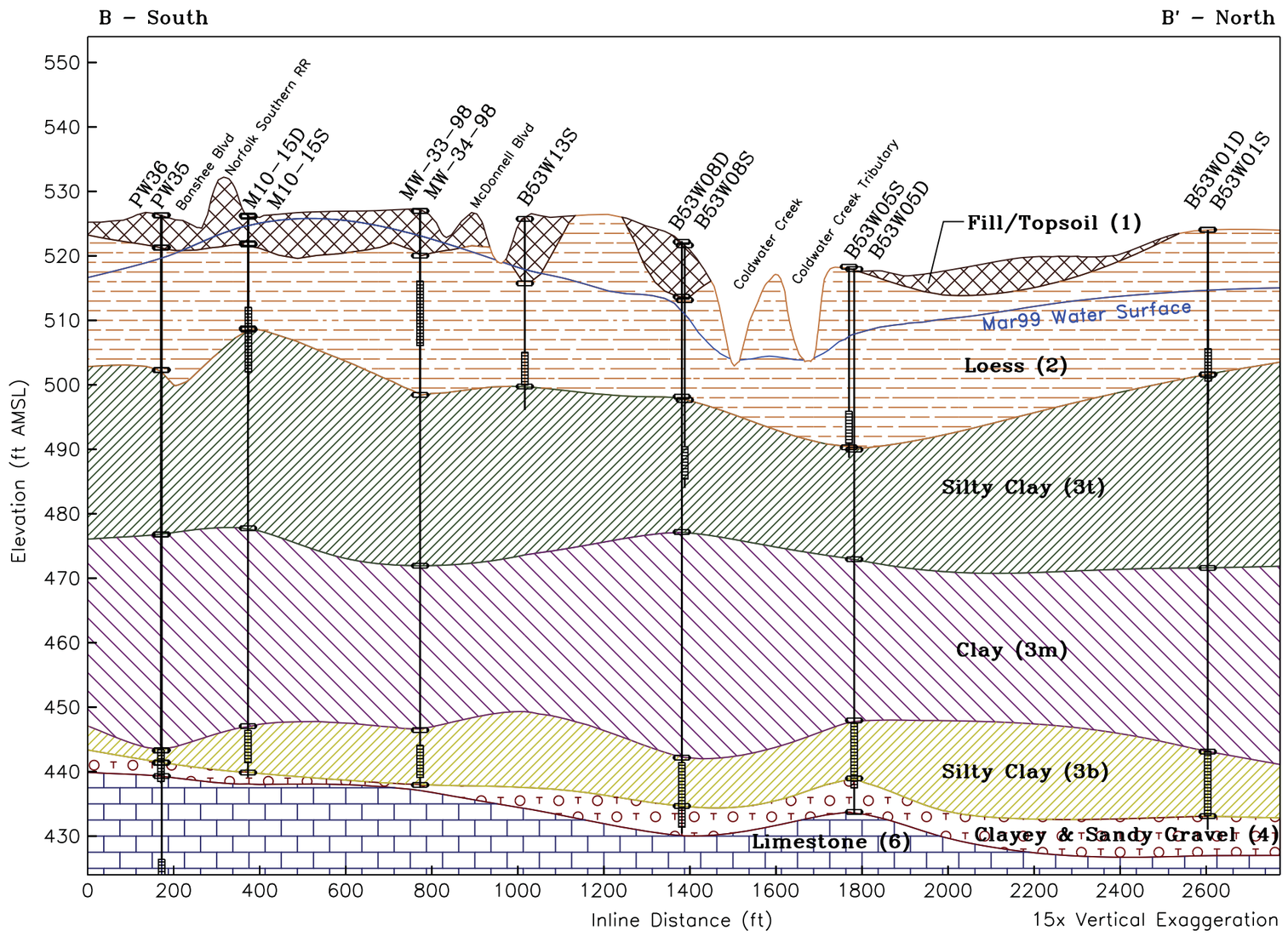
Third Five-Year Review Report
for Formerly Utilized Sites
Remedial Action Program
(FUSRAP) St. Louis Sites

Drawn By: N. Voorhies

Rev. No. - Date: 0 - 08/29/00 rev01/15/15

File: SLAPSGlg05ExtendedAAS.sho

Figure III-8. Geologic Cross-Section A-A' at the SLAPS



Notes

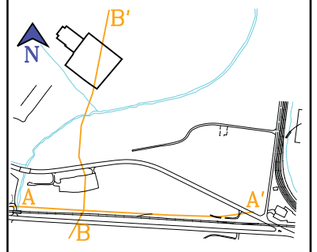
Geologic data used in the cross section collected through 2000.

Legend

Borehole pick

Well screen

Cross Section Location Map



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Third Five-Year Review Report
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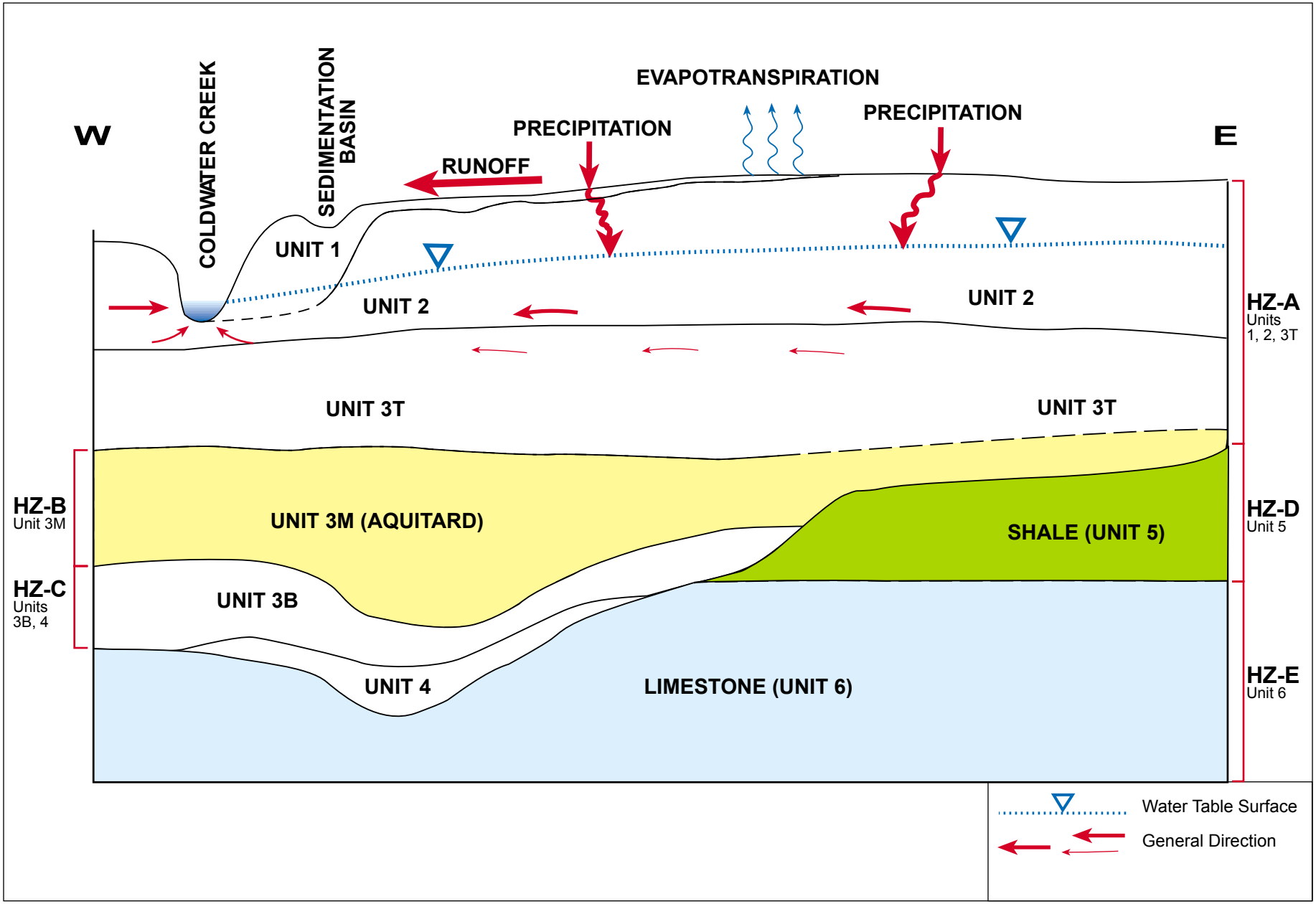
(FUSRAP) St. Louis Sites

Drawn By: N. Voorhies

Rev. No.- Date: 0 - 08/29/00 rev01/15/15

File: SLAPSGlg05ExtendedBBS.sho

Figure III-9. Geologic Cross-Section B-B' at the SLAPS and SLAPS VPs



FUS St. Louis 2 11/99 (09/95)

Figure III-10. Conceptual Model of Ground-Water Flow at SLAPS Showing Stratigraphic Units and Hydrostratigraphic Zones (HZs)

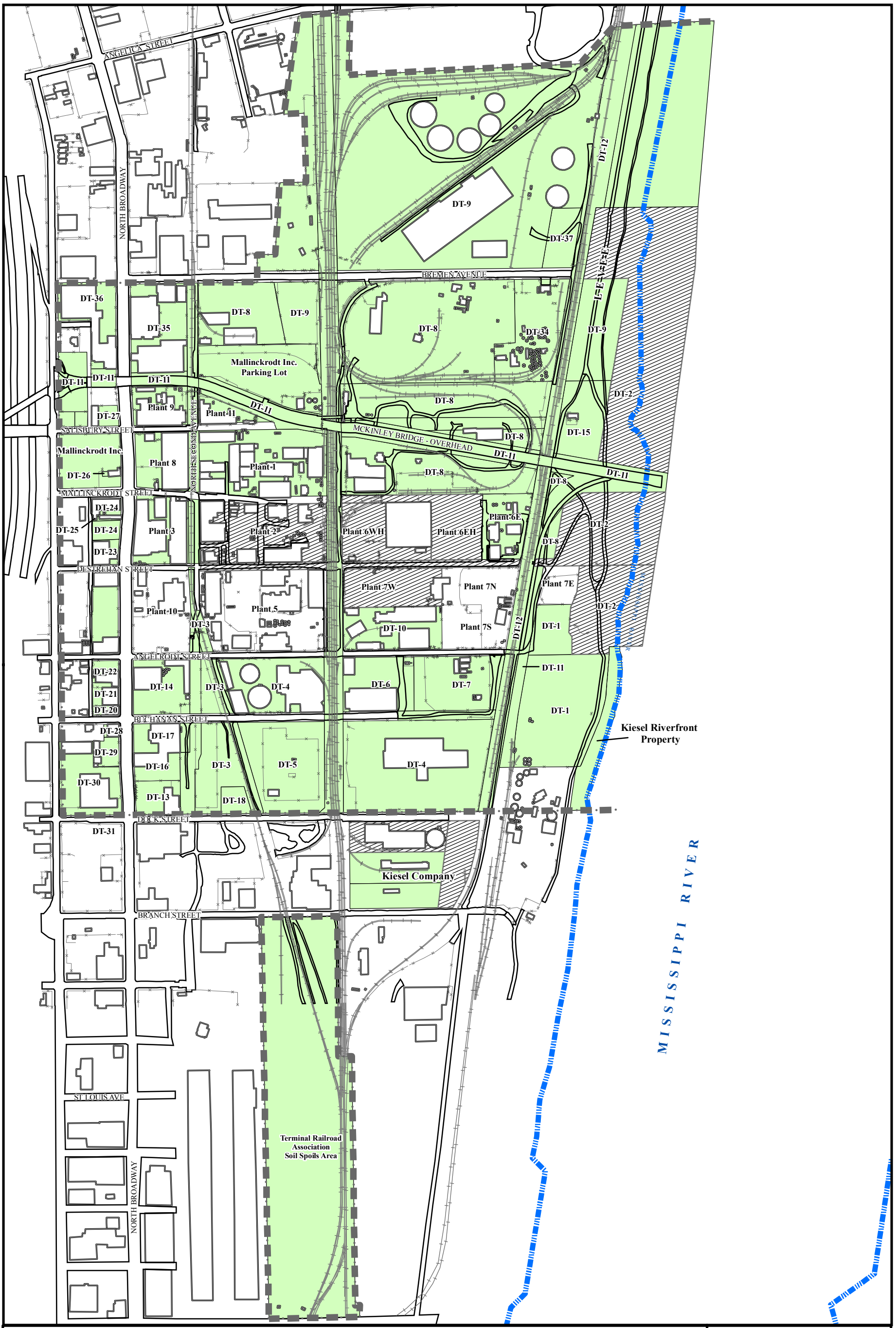


Figure IV-1. Remediation Status of the St. Louis Downtown Site

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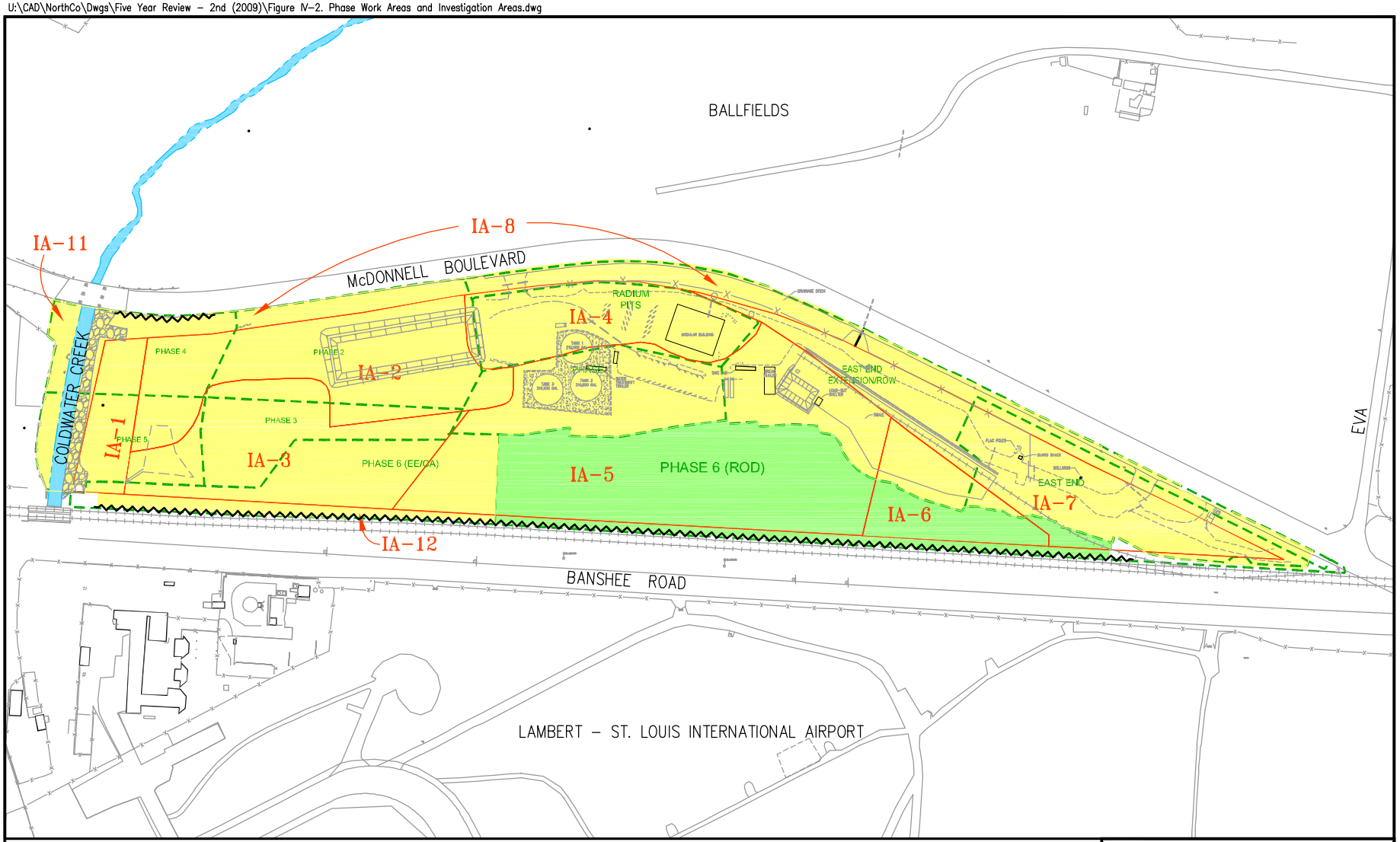
DRAWN BY:	REV:	DATE:
FPB, DLL	0	10/28/2014

U:\CAD\NorthCo\Dwgs\Five Year Review – 2nd (2009)\Figure IV-2. Phase Work Areas and Investigation Areas.dwg



GENERAL LEGEND:

- PHASE BOUNDARY
- INVESTIGATION AREA BOUNDARY
- REMOVAL ACTIONS (EE/CA)
- REMEDIAL ACTIONS (ROD)
- GABION WALL CONSTRUCTED BY DOE IN 1985 AND REMOVED BY USACE DURING EXCAVATION OF SUS 43–45.
- SHEET PILE

STATE PLANE GRID (EAST ZONE NAD 83)

SCALE

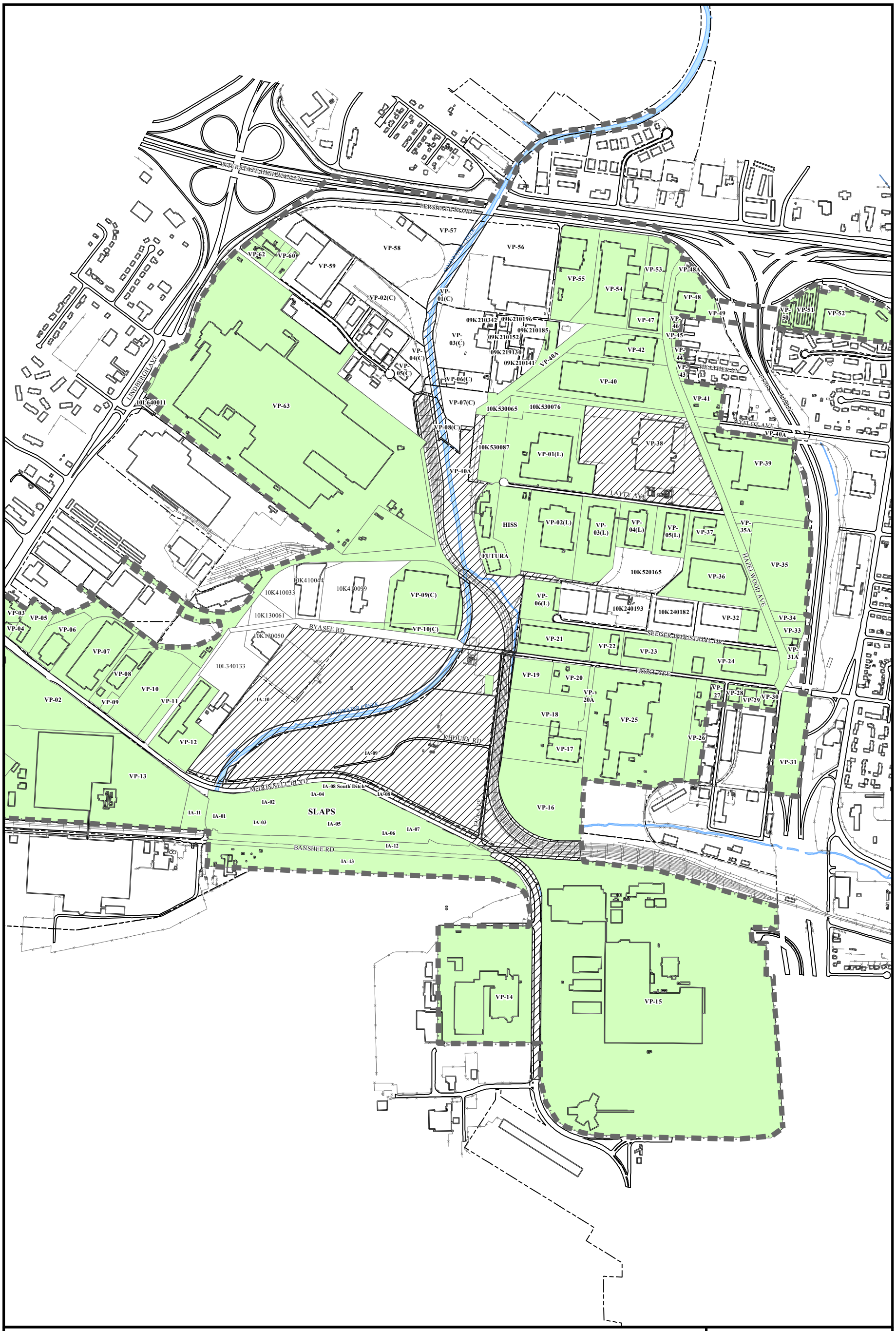
0 325 650 FT

FUSRAP

Figure IV-2. Phase Work Areas and Investigation Areas at SLAPS

DRAWN BY:	REV. NO./DATE:
F. Bauer	06/28/10

Path: U:\GPS\NorthCo\Five Year Review\Projects\2014\Rev0\Figure IV-3. Remedial Action Status of the North St. Louis County Sites.mxd



Legend

- North County ROD Boundary
- Fence
- Railroad
- Parcel Boundary
- Road
- River/Stream
- Building

Remedial Action Status at the end of Third Five-Year Review Period

- Remedial Action in Progress
- Property Complete

N
W E
S

MO-East State Plane
(NAD 83, Feet)

0 490 980 Feet

Figure IV-3.
Remediation Status of the North St. Louis County Sites

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DRAWN BY:	REV:	DATE:
TDC	0	5/19/2014

Legend

- HU-A
- HU-B
- ROD Boundary
- Railroad
- Vicinity Properties
- Mallinckrodt Property
- River/Stream
- Building
- Road
- Tank

N
W E
S

MO-East State Plane
(NAD 83, Feet)

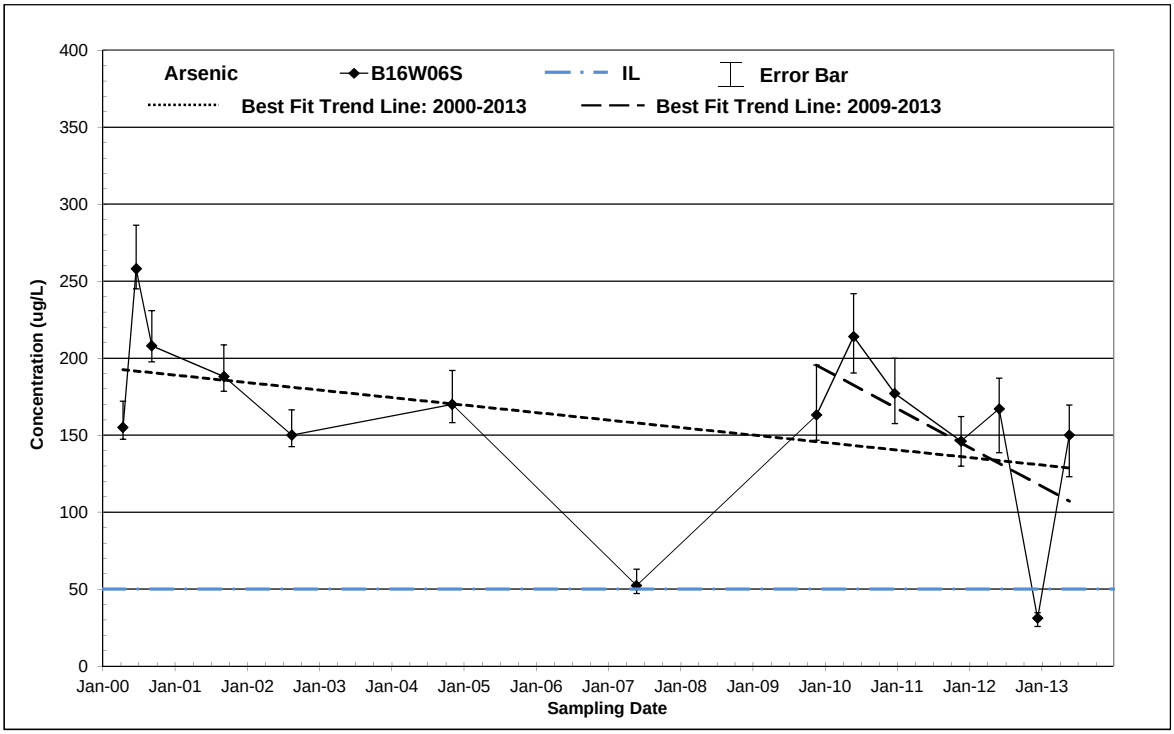
0 115 230 Feet

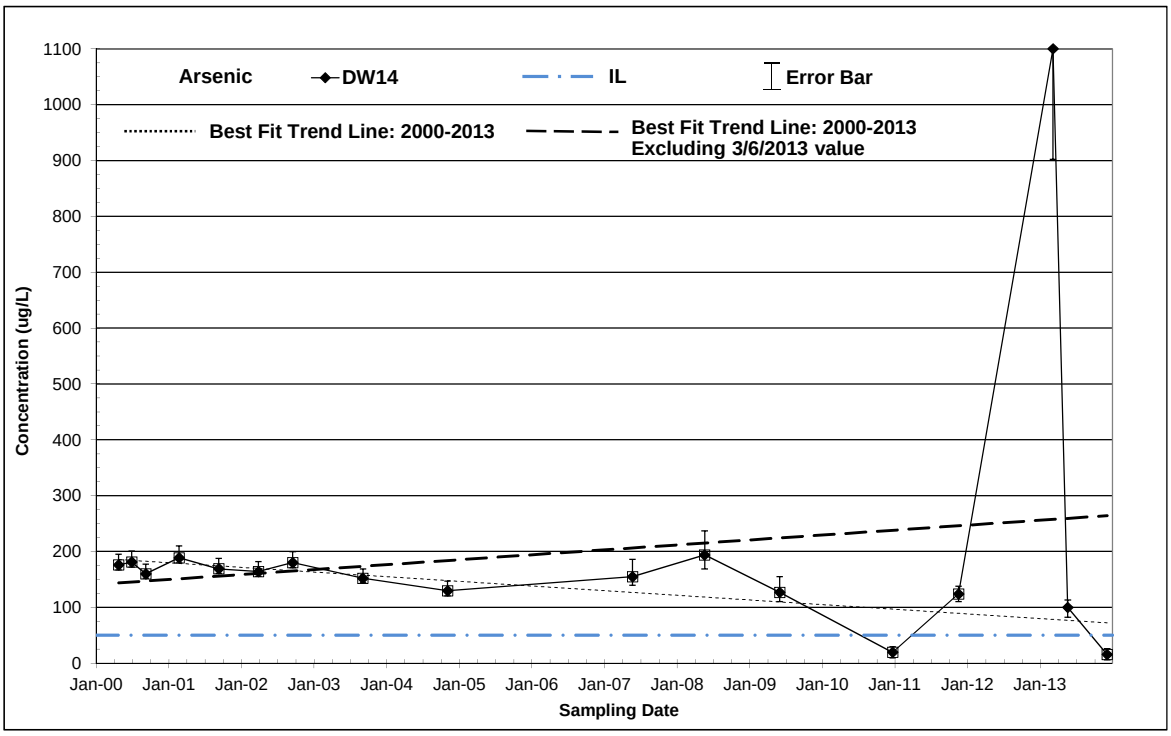
Figure VI-1
Ground-Water Monitoring Well Locations at the SLDS

FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	7/15/2015

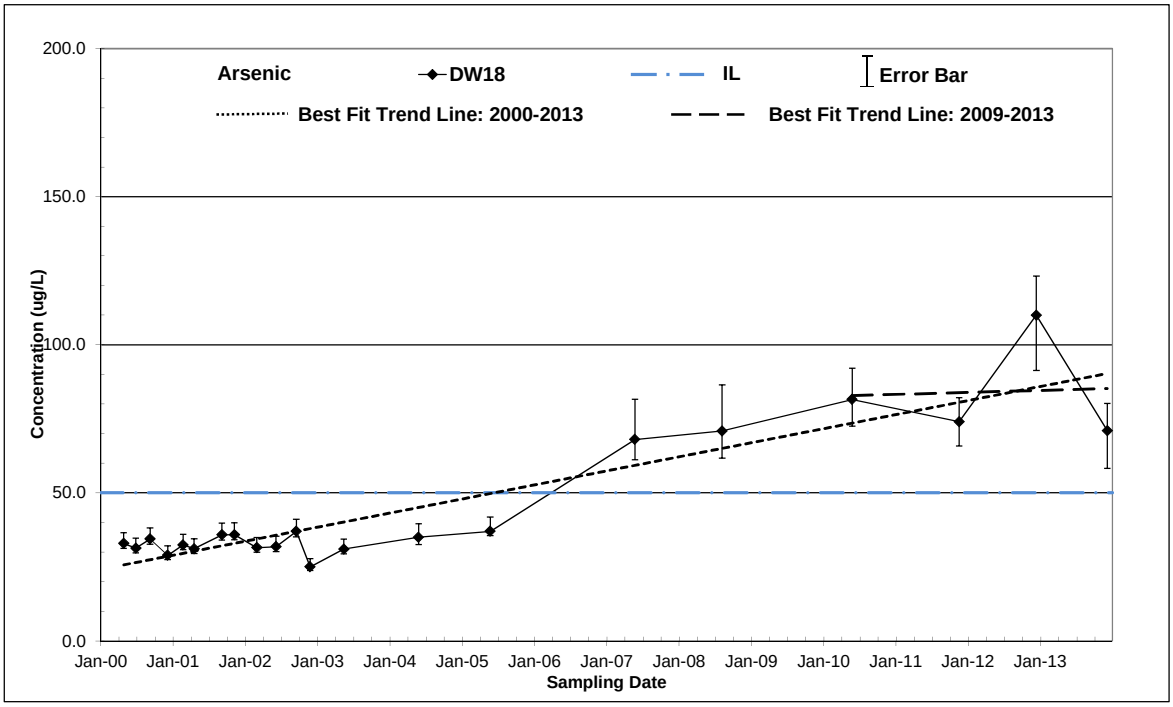
Path: U:\GPS\SLDS\Five Year Review\Projects\2014\Rev0\Figure VI-1 Ground-Water Monitoring Well Locations at the SLDS.mxd

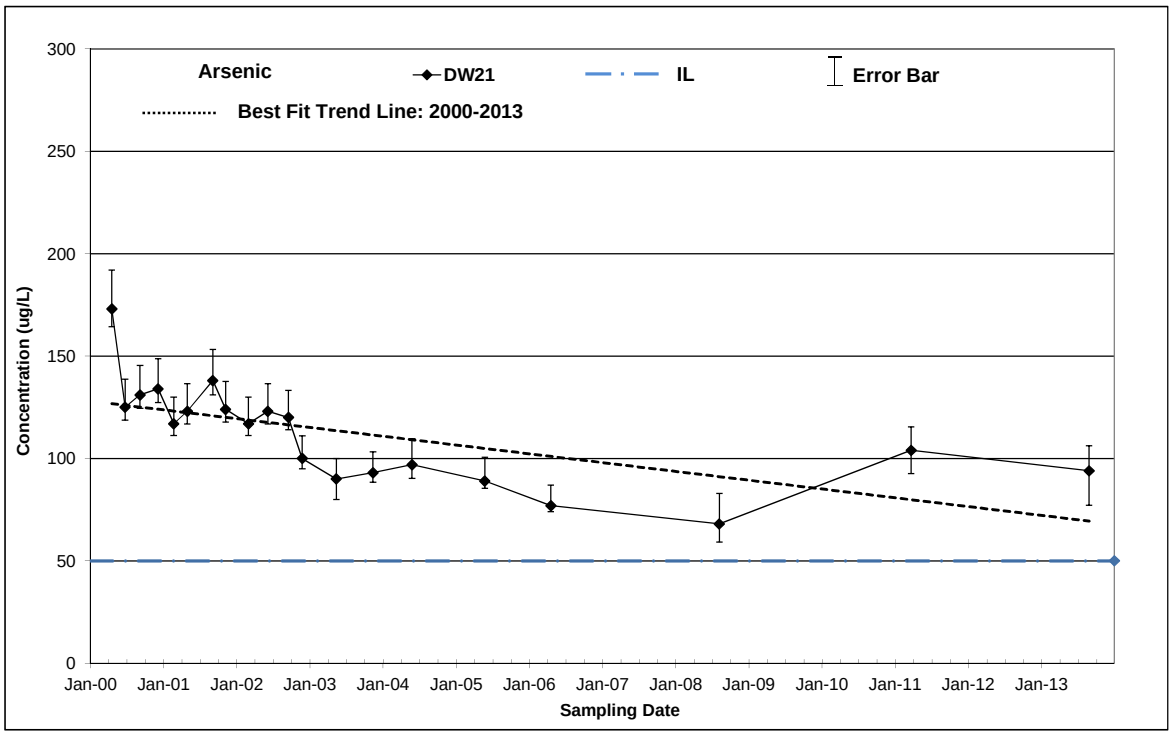




Notes:
For arsenic results less than 3 times the reporting limit (RL), the error bar represents ± RL.
For arsenic results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.

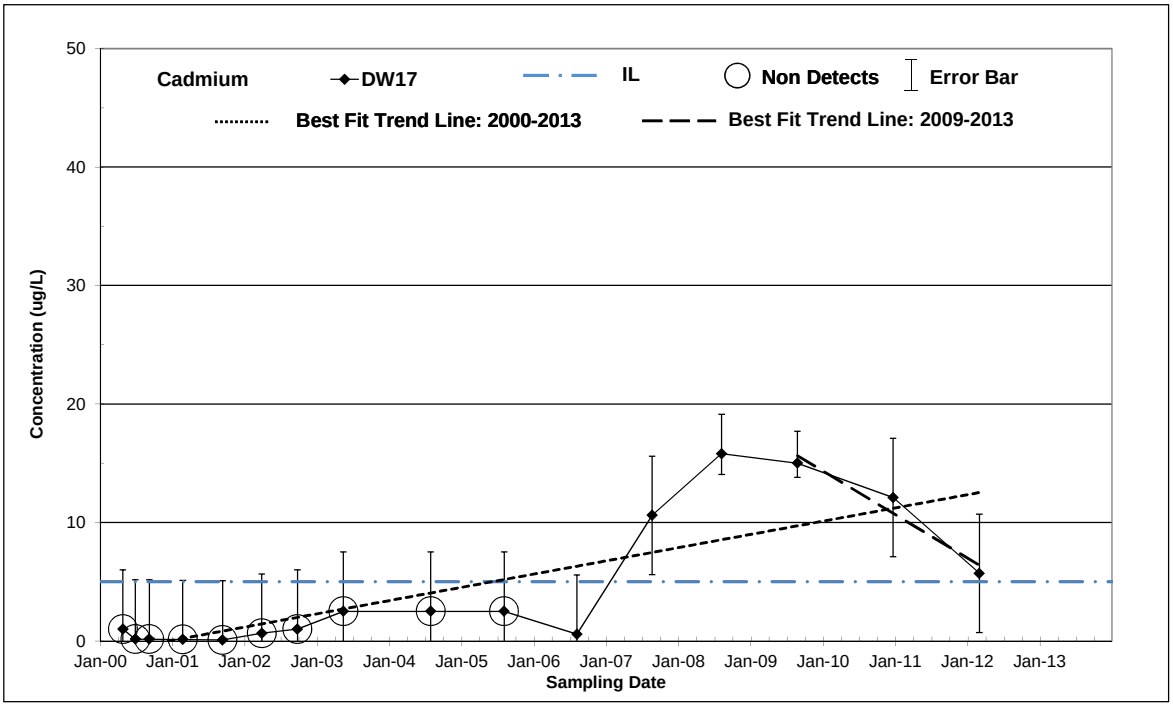
Figure VI-2. Trend Analysis of Metals Concentrations in Ground Water at the SLDS





Notes:
For arsenic results less than 3 times the RL, the error bar represents ± RL.
For arsenic results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.

Figure VI-2. Trend Analysis of Metals Concentrations in Ground Water at the SLDS (Continued)



Notes:
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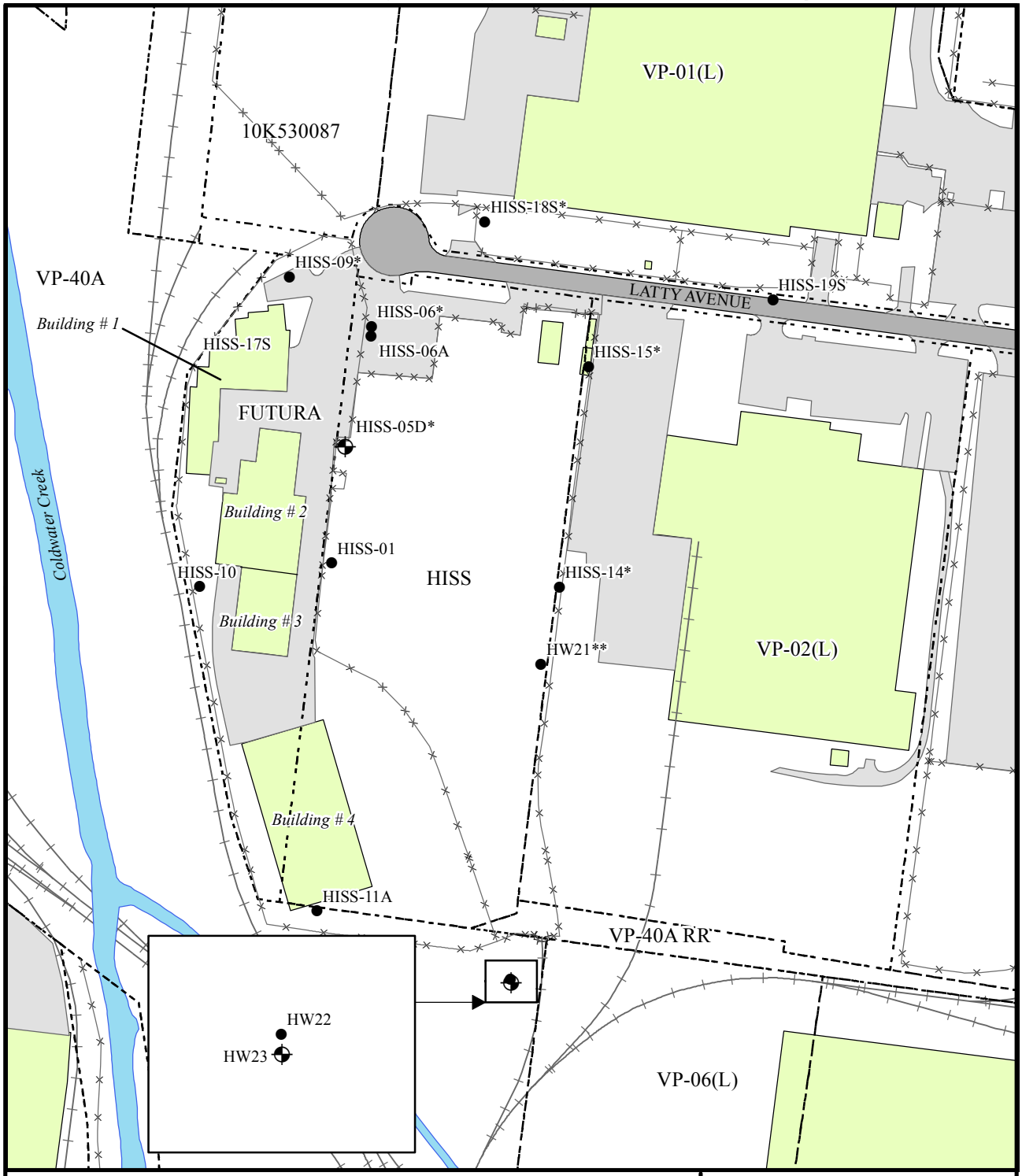
For cadmium results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.

Figure VI-2. Trend Analysis of Metals Concentrations in Ground Water at the SLDS (Continued)

Path: U:\GPS\NorthCo\Five Year Review\Projects\2014\Rev0\Figure VI-3 Existing Monitoring Well Locations at the Latty Avenue Properties.mxd



LEGEND:

- Buildings
- Road
- Parking Lots
- Railroad
- River/Stream
- Fence
- Parcel Boundary
- Upper Zone Monitoring Well
- Lower Zone Monitoring Well

* HISS-05D, HISS-06, HISS-09, HISS-14, HISS 15, HISS-18S, and HW21 were decommissioned in CY 2011

N W E S

MO-East State Plane (NAD 83, Feet)

0 95 190 Feet

Figure VI-3. Existing Monitoring Well Locations at the Latty Avenue Properties

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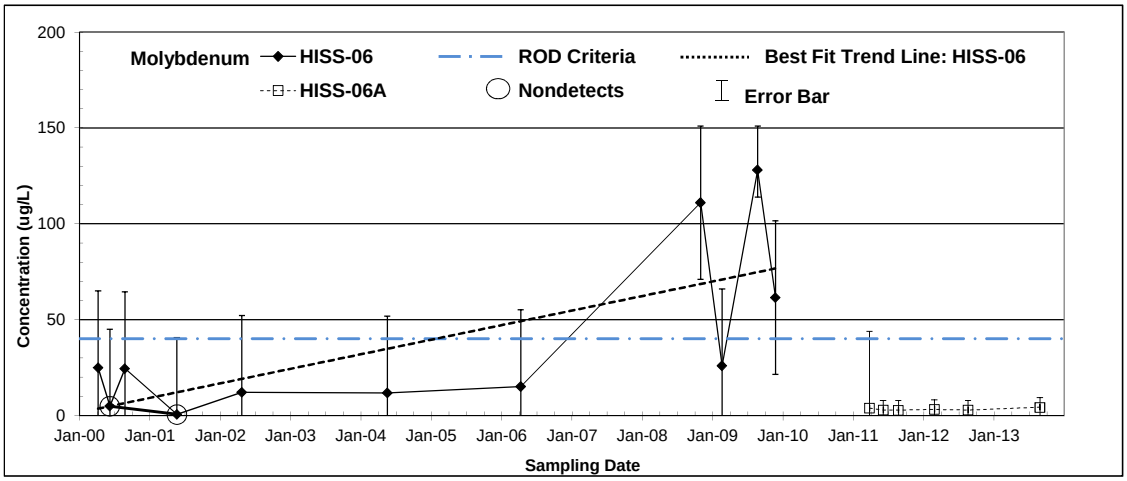
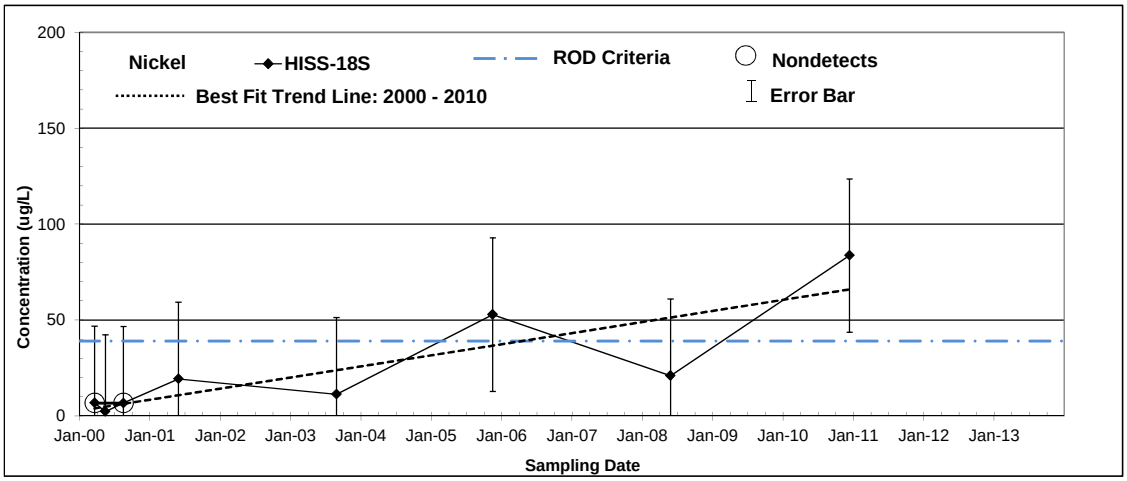
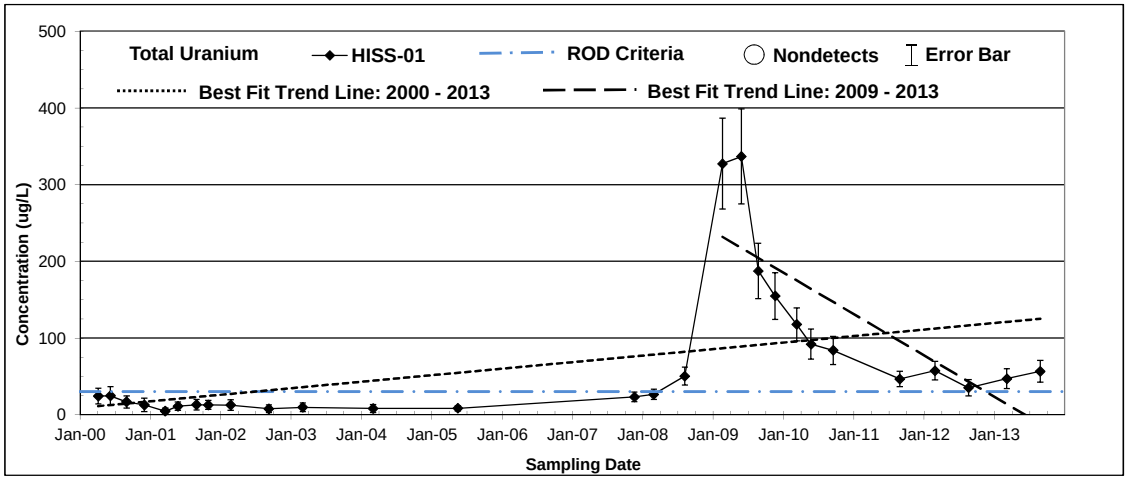
TDC	0	7/16/2015



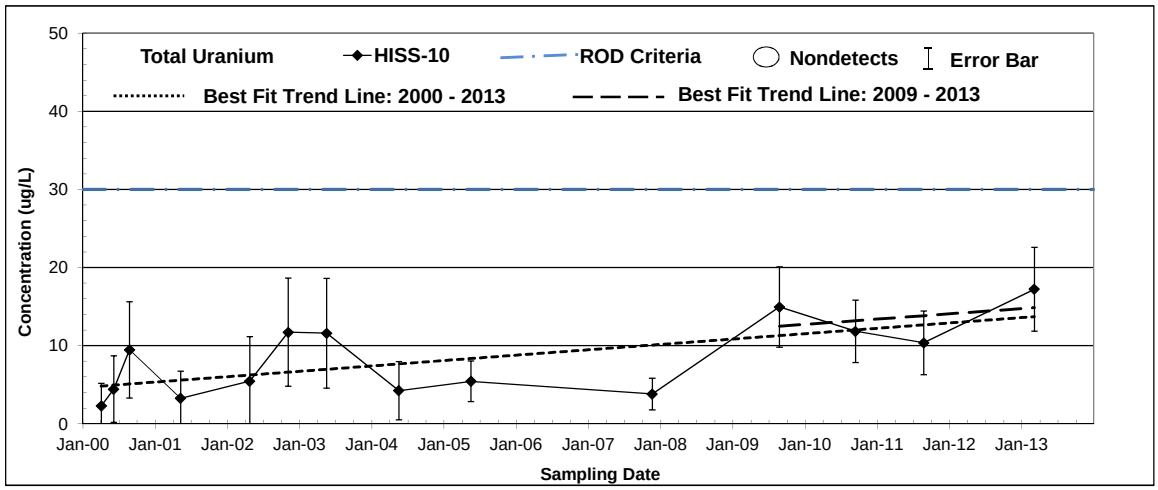




Notes:

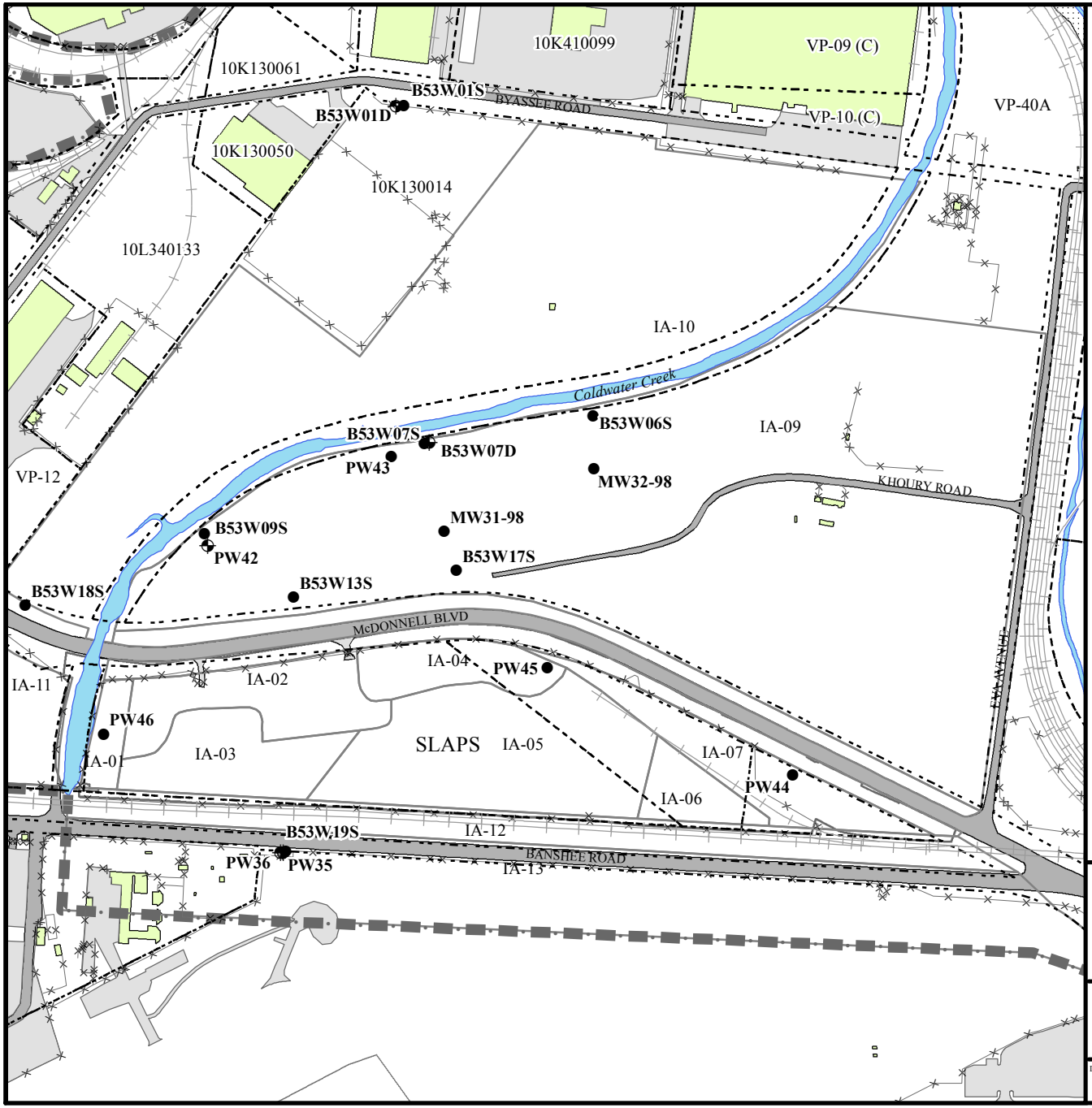
For inorganic results less than 3 times the RL, the error bar represents ± RL.
For inorganic results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier inorganic results are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.
For total uranium, the error bar represents ± the sum of the measurement errors for U-234, U-235, and U-238, converted to ug/L.

Figure VI-4. Trend Analysis of Metals and Total Uranium Concentrations in Ground Water at the HISS



Notes:
For total uranium, the error bar represents ± the sum of the measurement errors for U-234, U-235, and U-238, converted to ug/L.

Figure VI-4. Trend Analysis of Metals and Total Uranium Concentrations in Ground Water at the HISS (Continued)



LEGEND:

- Buildings
- River/Stream
- Road
- Fence
- Parking Lot
- Investigation Area
- ROD Boundary
- Parcel Boundary
- Existing Lower Zone Monitoring Well
- Existing Upper Zone Monitoring Well

N
W E
S

MO-East State Plane
(NAD 83, Feet)

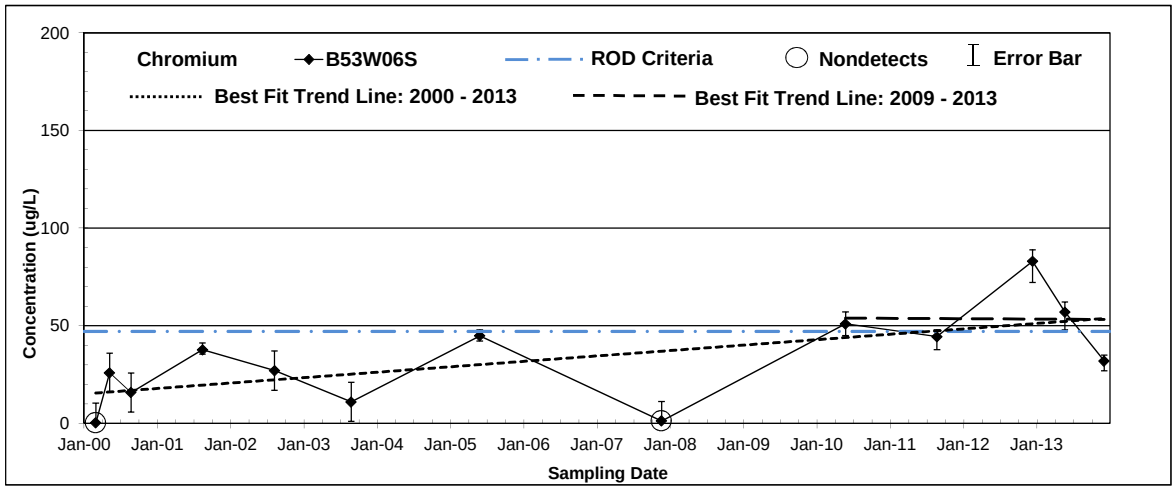
0 230 460 Feet

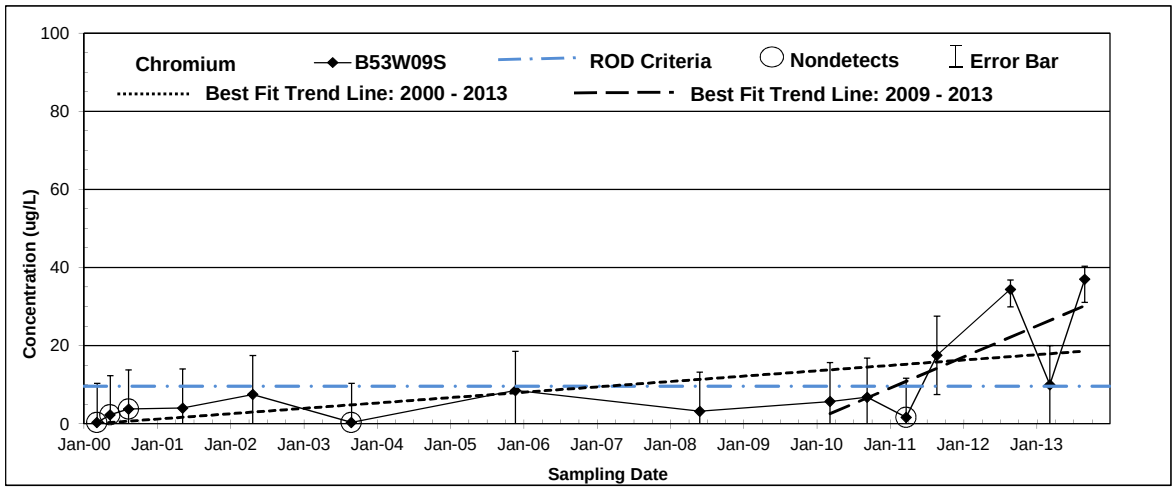
Figure VI-5. Ground-Water Monitoring Well Locations at the SLAPS and Surrounding SLAPS VPs

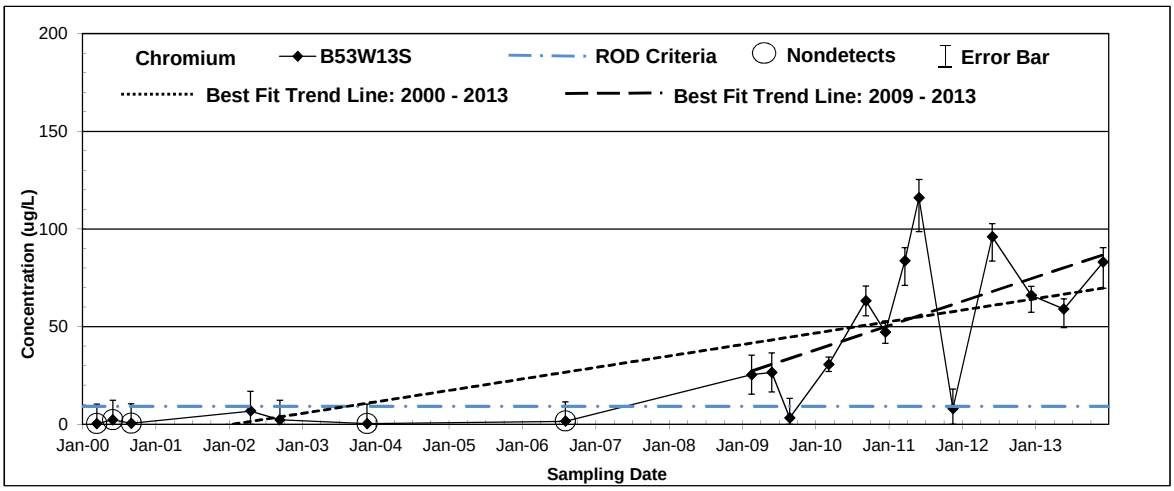
FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	5/16/2014

Path: U:\GPS\NorthCo\Five Year Review\Projects\2014\Rev0\Figure VI-5 Ground-Water Monitoring Well Locations at the SLAPS and Surrounding SLAPS VPs.mxd

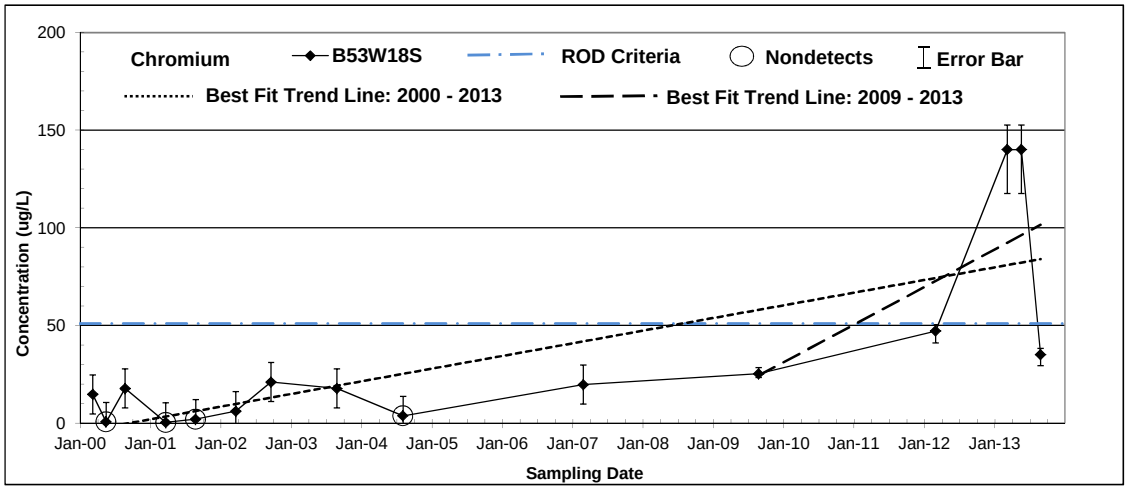


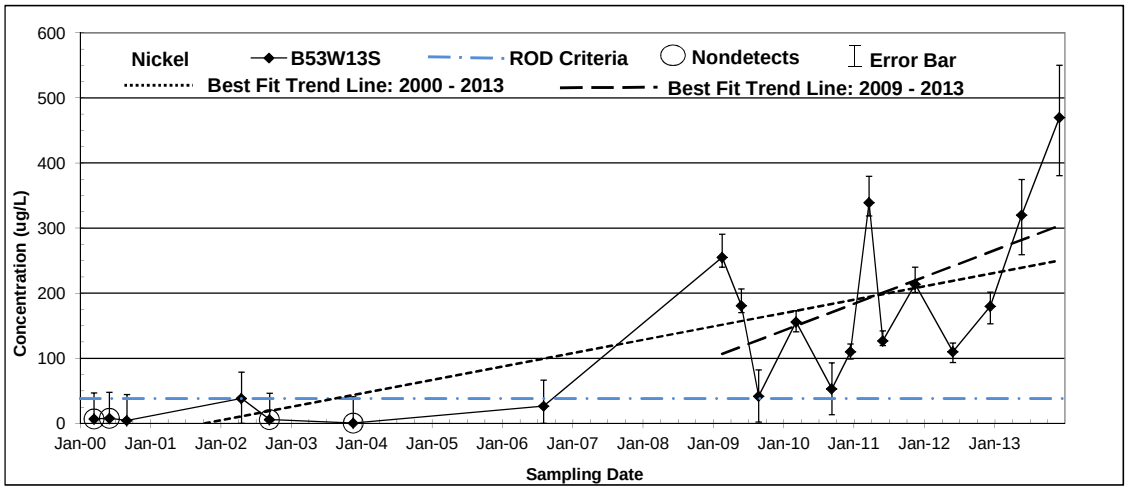


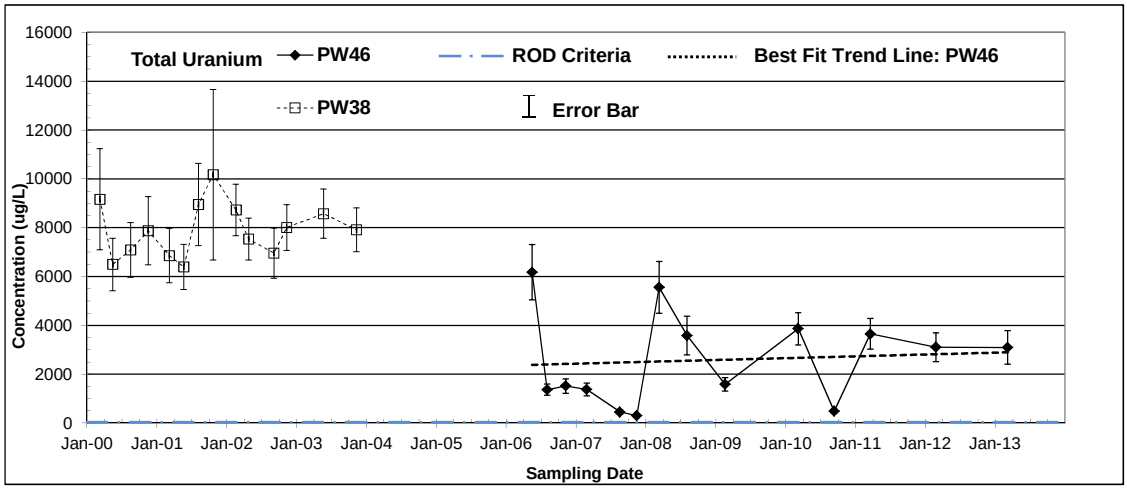


Notes:
For inorganic results less than 3 times the RL, the error bar represents ± RL.
For inorganic results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier inorganic results are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.

Figure VI-6. Trend Analysis of Metals and Total Uranium Concentrations in Ground Water at the SLAPS



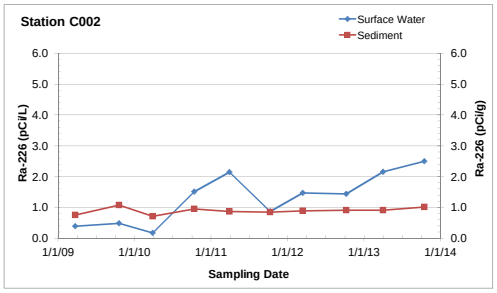


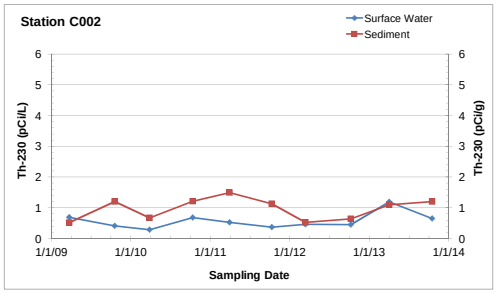


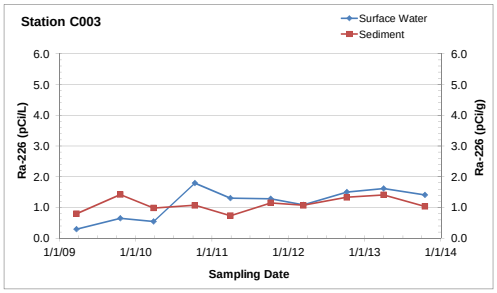
Notes:

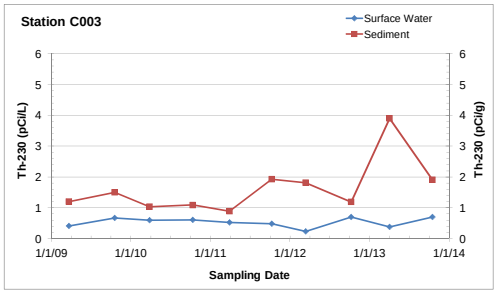
For inorganic results less than 3 times the RL, the error bar represents ± RL.
For inorganic results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
Error bars for 2003 and earlier inorganic results are based on laboratory control limits reported for 2003. Error bars for 2004 and later are based on laboratory control limits reported for the respective years.
For total uranium, the error bar represents ± the sum of the measurement errors for U-234, U-235, and U-238, converted to ug/L.

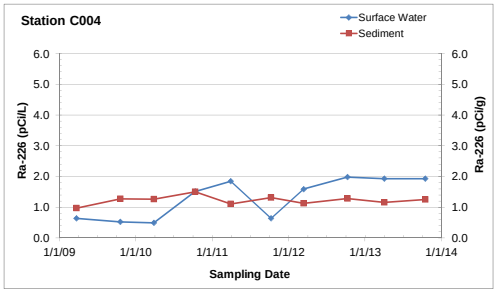
Figure VI-6. Trend Analysis of Metals and Total Uranium Concentrations in Ground Water at the SLAPS (Continued)

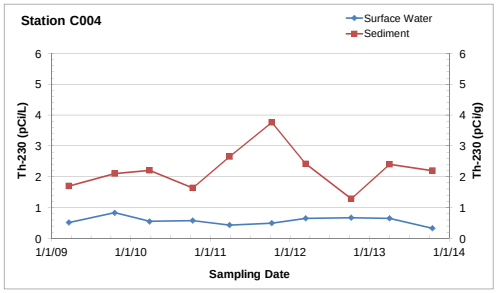


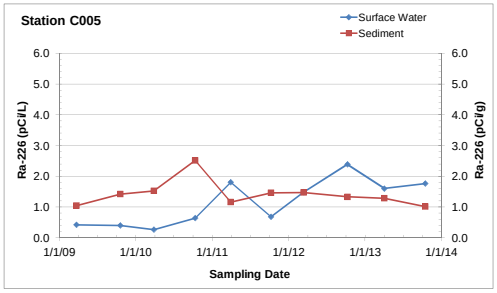


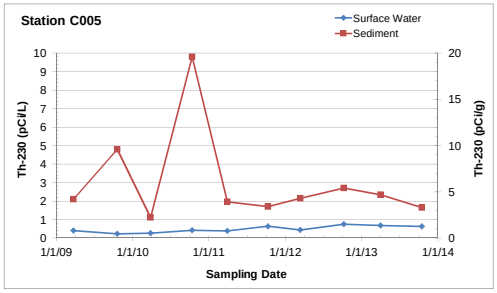


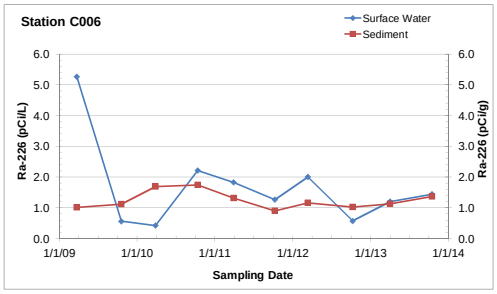


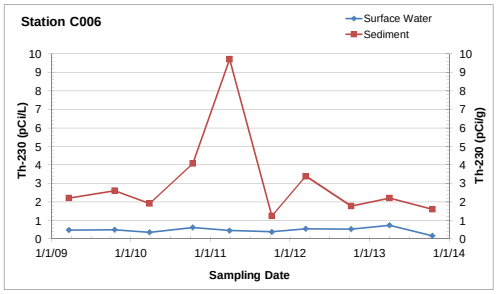


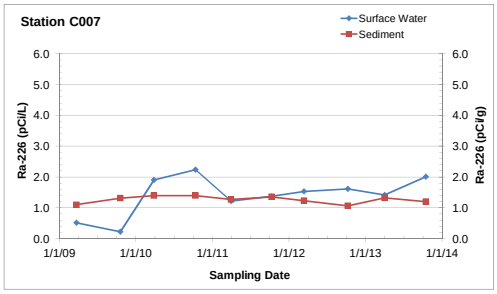












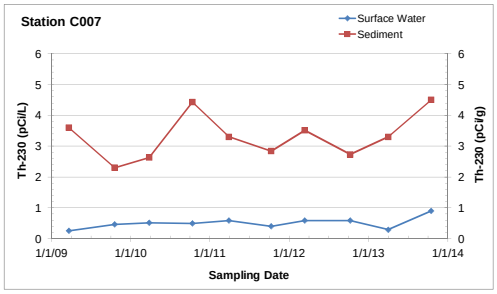
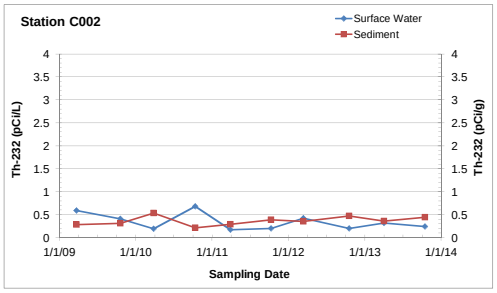
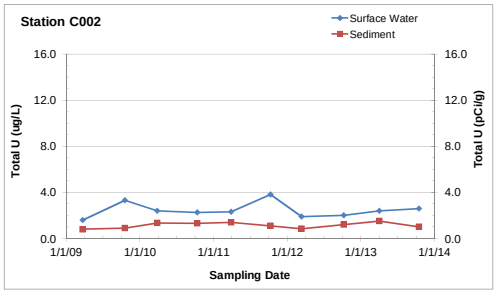
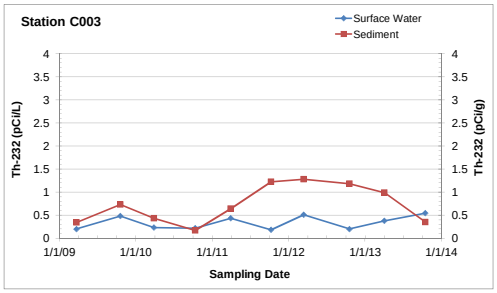
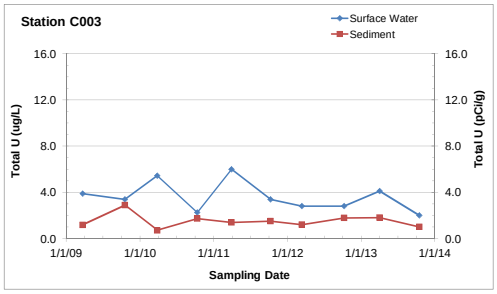


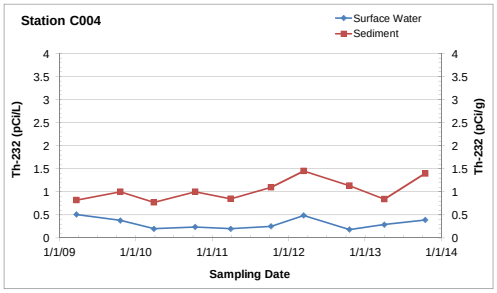
Figure VI-7. Comparison of Concentration Trends for Surface Water and Sediment

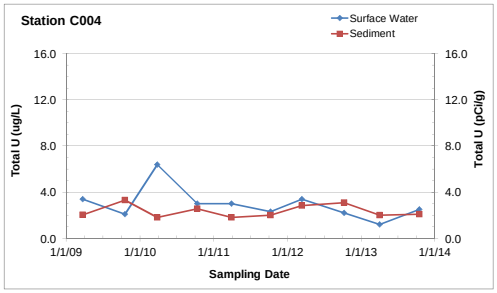


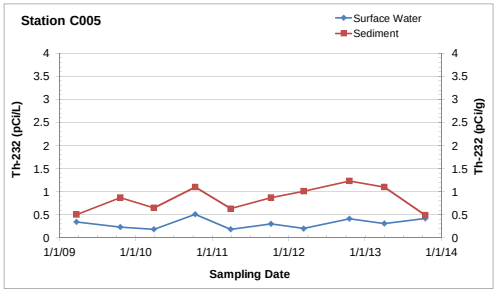


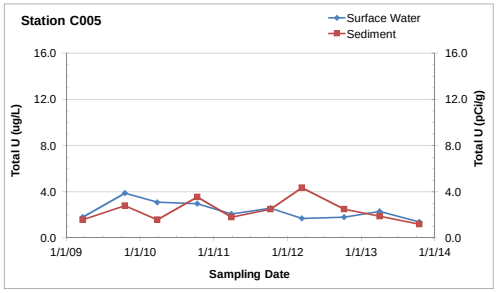


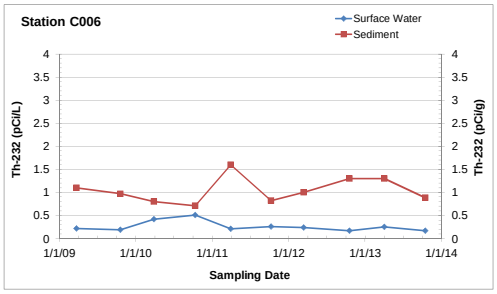


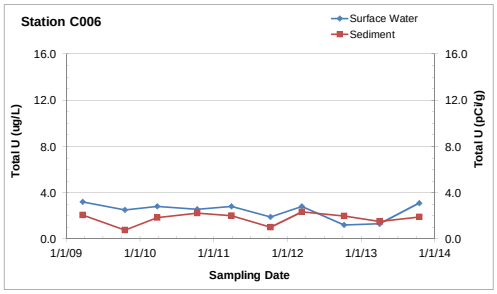


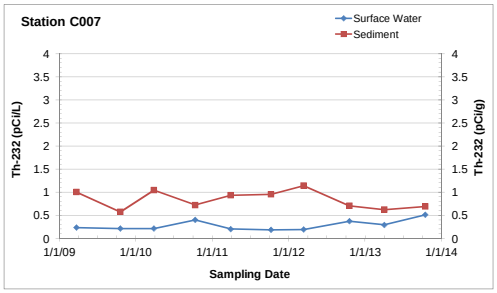












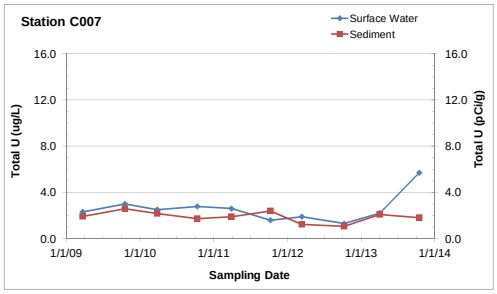


Figure VI-7. Comparison of Concentration Trends for Surface Water and Sediment (Continued)

APPENDIX A

SUMMARY OF DOCUMENTS REVIEWED

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Table A-1. Summary of Documents Reviewed

Document Name	Summary
SLS (ALL)	
Community Relations Plan for the St. Louis FUSRAP Sites, Revision 4, for St. Louis, Missouri, Final, December 3, 2003 *Community Involvement Plan for the St. Louis FUSRAP Sites, Revision 0, for St. Louis, Missouri*, Rev. 0, May 2015	The community relations plan and the CIP outline the activities that are conducted to inform and involve the public in the CERCLA process at the SLS. The plans inform the public about the cleanup process and the role of the USACE and other stakeholders in this process. These plans describe how the public can access information about the remediation and how a citizen can be involved in the decision-making process. The plans identify the primary concerns expressed during community interviews (conducted in CY 2003 and CY 2015) and other issues raised by the community.
Initial Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites, Final, August 23, 2004 *Second Five-Year Review Report for Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis Sites*, Final, September 22, 2010	These USACE documents discuss the remediation progress at the SLS during each five-year review period: the initial review period from September 1998 through August 30, 2003, and the second review period from September 2003 through December 2008. The documents describe the five-year review process and summarize the results of monitoring conducted at the SLS over the review period. The documents also include technical assessments of the remedy which conclude that the remedy is functioning as intended and is protective. Issues that potentially could affect the future protectiveness of the remedy are identified and recommendations/follow-up actions are proposed.
SLDS (ALL)	
Record of Decision for the St. Louis Downtown Site, Final, October 1998	This USACE document presents the selected remedial action for the cleanup of wastes related to MED/AEC operations in accessible soil and ground water beneath the SLDS. The SLDS consists of property owned by Mallinckrodt LLC and VPs. Accessible soil is soil that is not beneath buildings or other permanent structures. The selected remedy was Alternative 6 of the SLDS FS, Selective Excavation and Disposal.
Memorandum for Record: Non-Significant Change To the Record of Decision for the St. Louis Downtown Site, March 31, 2005	This USACE memorandum documents a non-significant change to the SLDS ROD. The change involves clarification of the delineation of the remedial area. The boundaries of the SLDS were clarified and amended to include additional areas to the north, south, and west of the SLDS.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (ALL) (Continued)	
Phase 1 Ground-Water Remedial Action Alternative Assessment (GRAAA) at SLDS, Final, June 30, 2003	This document is a requirement of the SLDS ROD, which states that "if monitoring of the B Unit shows that the MED/AEC COCs have significantly exceeded MCLs or thresholds established in 40 *CFR* 192, a Ground-Water Remedial Action Alternative Assessment (GRAAA) would be initiated." The sampling results exceeding the total uranium IL in monitoring well DW19 initiated Phase 1 (the assessment phase) of the GRAAA. Monitoring of the Mississippi Alluvial Aquifer (HU-B) shows that ground-water samples from three wells have exceeded the ILs for one or more of the COCs established in the SLDS ROD. This report summarizes the ground-water data for the three wells and provides recommendations for further assessment as part of the EMDARs and for conducting the second (investigation) phase of the GRAAA upon completion of remediation of likely source areas.
St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009, Rev. 0, August 5, 2010 *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2010*, Rev. 0, July 8, 2011 *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2011*, Rev. 0, July 13, 2012 *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2012*, Rev. 0, July 19, 2013 *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013*, Rev. 0, July 23, 2014	These EMDARs for CYs 2009 through 2013 provided an evaluation of the data collected as part of the implementation of the environmental monitoring program for the SLDS. Environmental monitoring is an on-going requirement under CERCLA. SLDS air and radiological monitoring activities were evaluated. SLDS excavation-water discharges and ground-water monitoring activities were described. A radiological exposure dose assessment was included in each EMDAR.
Environmental Monitoring Implementation Plan for the St. Louis Downtown Site for Calendar Year 2009, Rev. 0, December 31, 2008 *Environmental Monitoring Implementation Plan for the St. Louis Downtown Site for Calendar Year 2010*, Rev. 0, February 1, 2010 *Environmental Monitoring Implementation Plan for the St. Louis Downtown Site for Calendar Year 2011*, Rev. 0, January 11, 2011 *Environmental Monitoring Implementation Plan for the St. Louis Downtown Site for Calendar Year 2012*, Rev. 0, December 30, 2011 *Environmental Monitoring Implementation Plan for the St. Louis Downtown Site for Calendar Year 2013*, Rev. 0, December 27, 2012	Annual Environmental Monitoring Implementation Plans were prepared for the SLDS on a CY basis. The reports explain the objectives of the environmental monitoring for the SLDS for CY 2009 through 2013 and define the evaluation criteria that are compared to the results.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (VPs)	
Post-Remedial Action Report for the St. Louis Downtown Site City-Owned Vicinity Property, Final, September 1999	This report describes the remedial action conducted at the City-Owned VP (DT-2) located at the eastern edge of the SLDS adjacent to the Mississippi River. The report concludes that the residual radioactivity on the City VP is below the concentration-based guidelines specified in the SLDS ROD.
Pre-Design Investigation Data Summary Report, Heintz Steel and Manufacturing Vicinity Property (DT-6), Appendix A.4.1 of the *Small Area Remediation Work Area-Specific Description, FUSRAP St. Louis Downtown Site,* Rev. 0, July 2001	This PDI report describes investigation activities conducted at the Heintz Steel and Manufacturing VP (DT-6) and results obtained during these activities. DT-6 is located south of the Thomas & Proetz Lumber Company VP (DT-10). The report also provides an evaluation of the depth and horizontal extent of radiological contamination at DT-6 based on the results of historical investigations and the results of the PDI.
Final Status Survey Evaluation Report for the St. Louis Downtown Site Archer Daniels Midland Vicinity Property (DT-1), Rev. 0, June 2002	This report documents and assesses the FSS conducted at the Kiesel (formerly ADM) VP (DT-1) location at the SLDS. The report concludes that the accessible areas at DT-1 meet the criteria for unrestricted use.
Pre-Design Investigation Summary Data Report, Gunther Salt South Vicinity Property (DT-4 South), Rev. 0, May 24, 2005 *Pre-Design Investigation Summary Report, Gunther Salt North at the FUSRAP St. Louis Downtown Site,* Final, June 9, 2005	These two PDI reports describe the investigations conducted at the Gunther Salt VP (DT-4), comprised of GSS and GSN. The purpose of the PDI activities at DT-4 was to evaluate the potential for radiological contamination to be present and to delineate the horizontal and vertical extent of areas of radiological contamination.
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Heintz Steel and Manufacturing Vicinity Property (DT-6) and Midwest Waste Vicinity Property (DT-7), Rev. 0, September 22, 2005	This report describes the remedial action conducted at the Heintz Steel and Manufacturing VP (DT-6) and the Midwest Waste VP (DT-7), located south and east of the main Mallinckrodt Property at the SLDS. Excavation of soils was conducted to achieve residual radionuclide concentrations below the SLDS ROD RGs. The report concludes that the accessible areas at DT-6 and DT-7 meet the criteria for unrestricted use.
Post-Remedial Action Report for the Soils within the St. Louis Downtown Site City of Venice, Illinois Property (DT-11), Rev. 0, September 22, 2005	This report describes the remedial action conducted at the City of Venice, Illinois VP (DT-11) at the SLDS. The report presents a comparison of the residual property conditions in accessible areas to the SLDS ROD RGs. The report concludes that the accessible areas at DT-11 meet the criteria for unrestricted use.
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Midtown Garage Vicinity Property (DT-29), Rev. 0, October 18, 2005	This report describes the remedial activities and the FSSE performed at the Midtown Garage VP (DT-29). DT-29 is located at 3227 North Broadway Street. The portions of DT-29 included in the report are the two Class 1 SUs that were defined on the southern end of the property under the main entrance driveway to the property. The report concludes that the accessible areas at DT-29 meet the criteria for unrestricted use.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (VPs) (Continued)	
Pre-Design Investigation and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-35 and DT-36, Rev. 0, April 3, 2009	This report documents the PDI and FSSE at two SLDS VPs: DT-35, owned by Community Wholesale Tire, and DT-36, owned by OJM, Inc. The properties are located near the intersection of Bremen Street and Broadway. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted to ensure that any residual radioactivity does not exceed the criteria specified in the SLDS ROD. The information presented in this report demonstrates that the accessible areas at DT-35 and DT-36 meet the criteria for unrestricted use.
Pre-Design Investigation Data Summary Report, City Property Vicinity Property (DT-2), FUSRAP St. Louis Downtown Site, Rev. 0, May 6, 2009	This report documents the results of a PDI at the City Property VP (DT-2). The portion of DT-2 included in the PDI report is comprised of three tracts of land situated between the BNSF Railroad VP (DT-12) and the Mississippi River. The northernmost boundary of DT-2 is just south of an eastern extension of Angelica Street, and the southern boundary of DT-2 is the eastern extension of the southern property line of the Kiesel Company VP (DT-1). The report identified 10 areas of radiological contamination at DT-2, based on the results of the GWS, the evaluation of the historical sample data, and the results from the PDI soil sampling activities
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Thomas and Proetz Lumber Company (DT-10), Rev. 0, July 12, 2010	This report summarizes the remedial activities and the FSSE performed at the Thomas and Proetz Lumber Company VP (DT-10). DT-10 is located near the intersection of Hall Street and Angelrodt Street. The report describes the remediation of the five areas of radiological contamination identified in the DT-10 PDI report. For the non-radiological COCs arsenic and cadmium, all site concentrations were less than corresponding SLDS ROD RGs. The report concludes that the accessible areas at DT-10 meet the criteria for unrestricted use.
Pre-Design Investigation Summary Report, Terminal Railroad Association Vicinity Property (DT-9), FUSRAP St. Louis Downtown Site, Rev. 0, April 7, 2010	This report documents the results of a PDI at the TRRA VP (DT-9). The portion of DT-9 addressed by this PDI is situated between the City of Venice, Illinois VP (DT-11) on the south, Angelica Street on the north, North Second Avenue on the west, and the Mississippi River on the east, and includes the accessible portions of the active TRRA rail line. Based on the GWS data and analytical result, seven areas were identified as containing concentrations of radiological COCs with resultant SOR values that were greater than or equal to 1.0.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (VPs) (Continued)	
Pre-Design Investigation Data Summary Report, Burlington Northern Santa Fe Railroad Vicinity Property (DT-12), FUSRAP St. Louis Downtown Site, Rev. 0, April 21, 2010	This report documents the results of a PDI at the BNSF Railroad VP (DT-12), which runs north-south along the eastern side of the SLDS. The portion of DT-12 evaluated during this PDI is bounded to the north by the southern edge of Angelica Street and to the south by the northern edge of Dock Street. Based on the results of the PDI sampling activities, six areas were identified as containing concentrations of radiological COCs with resultant SOR values greater than or equal to 1.0.
Pre-Design Investigation and Final Status Survey Evaluation for Accessible Soils within the St. Louis Downtown Site Vicinity Properties DT-5, DT-13, DT-14, DT-16, DT-18, and the Second Street Corridor, Rev. 0, October 25, 2010	This report documents the PDI and FSSE at five SLDS VPs (DT-5, DT-13, DT-14, DT-16, and DT-18) and the Second Street Corridor. As a group, these properties are referred to as the South of Angelrodt Properties. These properties are located south of Angelrodt Street, north of Dock Street, east of North Broadway, and west of a major railroad corridor. PDI analytical data indicated that no residual radioactivity above the RGs was present on the properties. The results of the FSSE indicated that remediation was not required. The information presented in this report demonstrates that the accessible areas at the South of Angelrodt Properties meet the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Gunther Salt (DT-4), Rev. 0, September 14, 2012	This report summarizes the remedial activities and the FSSE performed at the Gunther Salt VP (DT-4). DT-4 is essentially comprised of two areas, GSN and GSS, which are located northwest and southeast, respectively, of the intersection of Buchanan and Hall Streets. The remediation involved excavation of two areas on GSN and three areas on GSS. The report concludes that the accessible areas at DT-4 meet the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Christiana Court, LLC (DT-17), Rev. 0, May 18, 2012	This report summarizes the remedial activities and the FSSE performed at the Christiana Court, LLC VP (DT-17). The property is located at the southeast corner of the intersection of North Broadway and Buchanan Street. The report describes the remediation of a small area of radiological contamination located in the parking lot on the western portion of the property. The FSSE demonstrates that the SLDS ROD RGs have been met and that the accessible areas at DT-17 meet the criteria for unrestricted use.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Metropolitan St. Louis Sewer District Lift Station (DT-15), Rev. 0, August 27, 2012	This report documents the PDI and FSSE at the MSD Lift Station VP (DT-15). The property is located near the intersection of the levee and McKinley Bridge. PDI analytical data indicated that no residual radioactivity above the RGs was present on the property. The results of the FSSE indicated that remediation was not required. The information presented in this report demonstrates that the accessible areas at DT-15 meet the criteria for unrestricted use.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (VPs) (Continued)	
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property DT-34, Rev. 0, September 21, 2012	This report documents the PDI and FSSE at the Hjersted VP (DT-34). The property is located south of Bremen Avenue, east and north of the PSC Metals VP (DT-8), and west of the BNSF Railroad VP (DT-12). PDI analytical data indicated that no residual radioactivity above the RGs was present at DT-34. The results of the FSSE indicated that remediation was not required. The report concludes that the accessible areas at DT-34 meet the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property PSC Metals, Inc. (DT-8), Rev. 0, July 15, 2013	This report summarizes the remedial activities and the FSSE performed at the PSC Metals, Inc. VP (DT-8). DT-8 consists of seven separate tracts bounded generally by Bremen Avenue on the north, the Mississippi River Levee on the east, the Mallinckrodt Chemical Plant on the south, and North Second Avenue on the west. FSS data confirmed that accessible soils left in place at DT-8 meet the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Norfolk Southern Railroad (DT-3), Rev. 0, September 23, 2013	This report summarizes the remedial activities and the FSSE performed at the Norfolk Southern Railroad VP (DT-3). The portion of Norfolk Southern Railroad property designated as DT-3 extends from Destrehan Street southward to Dock Street. Three separate areas were excavated. The first area was located east of the railroad track and north of Angelrodt Street. The second area was located west of the railroad track and south of Angelrodt Street. The third area was located west of the railroad track and south of Buchanan Street. The FSSE demonstrates that the SLDS ROD RGs have been met and that the accessible areas at DT-3 meet the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Vicinity Property Terminal Railroad Association Soil Spoils Area, Rev. 0, September 10, 2013	This report summarizes the remedial activities and the FSSE performed at the TRRA Soil Spoils Area. FSS data confirmed that accessible soils left in place at the TRRA Soil Spoils Area meet the criteria for unrestricted use.
Pre-Design Investigation Summary Data Report, Kiesel Hall Street Property, FUSRAP St. Louis Downtown Site, Rev. 0, March 14, 2013	This report documents the results of a PDI at the Kiesel Hall Street Property, located north and east of the intersection of Hall and Branch Streets. The investigation activities conducted at the Kiesel Hall Street Property and the radiological results obtained during these activities are described. Based on the GWS data and analytical results, seven areas were identified as containing concentrations of radiological COCs with resultant SOR values greater than or equal to 1.0.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (VPs) (Continued)	
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Downtown Site Vicinity Property Lange-Stegmann (DT-37), Rev. 0, September 23, 2013	This report documents the results of a PDI and FSSE at the Lange-Stegmann VP (DT-37). The property is leased by Lange-Stegmann from the Angelica Riverfront Redevelopment Corporation. DT-37 is located north of Bremen Avenue, west of Wharf Street, and southeast of DT-9. PDI analytical data indicated that no residual radioactivity above the RGs was present on DT-37 and that the property was ready for an FSS. The FSSE indicated that remediation on DT-37 was not required. The report concludes that DT-37 meets the criteria for unrestricted use.
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Property Burlington Northern Santa Fe Railroad (DT-12), Rev. 0, August 19, 2014.	This report summarizes the remedial activities and the FSSE performed at the BNSF Railroad VP (DT-12). The remedial action included not only removal and disposal of contaminated soil, but also removal and replacement of approximately 20 ft (8.8 m) of the Destrehan Street 20-inch (50.8-cm) sewer main. The FSSE demonstrates that the SLDS ROD RGs have been met and that the accessible areas at DT-12 meet the criteria for unrestricted use.
SLDS (Mallinckrodt)	
Pre-Design Investigation Data Summary Report, Plants 6 East Half and 6E, FUSRAP St. Louis Downtown Site, Rev. 0, August 18, 2000	This report describes the PDI activities performed in 1999 at Plants 6EH and 6E and provides a summary of the results. The PDI data presented in this report support design of the excavations for the Plants 6EH and 6E remedial action.
Pre-Design Investigation Summary Report Plants 6 West Half and 7W, FUSRAP St. Louis Downtown Site, Rev. 0, January 26, 2001	This report describes the PDI activities performed at Plants 6WH and 7W, and provides a summary of the results. Plant 6WH consists of the area west of Building 101. The purpose of the PDI at Plant 6WH was to more accurately delineate the nature and extent of radiological soil contamination at Plant 6WH prior to initiation of remedial action activities. Concurrent PDI activities were conducted in Plant 7W to delineate the nature and extent of potential radiological contamination that may extend from Plant 6WH into Plant 7W beneath Destrehan Street. Results were used to characterize the extent of radiological contamination in the shallow and deep zones to support RD.
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Plant 2 Property, Rev. 0, January 2002	This report documents and assesses the effectiveness of the remedial action for accessible soil conducted at Plant 2. In addition to describing the Plant 2 remediation and residual site condition, this report also documents the data and information from Plant 2 necessary for removal of the SLDS from the NPL when remedial actions are complete. The report concludes that the accessible areas at Plant 2 meet the criteria for unrestricted use.
Post-Remedial Action Report for the Accessible Soils within the St. Louis Downtown Site Plant 1 Property, Rev. 0, September 10, 2004	This report documents and assesses the effectiveness of the remedial action for accessible soil conducted at Plant 1. It describes the Plant 1 remediation activities and presents an evaluation of residual site conditions. At completion of the remedial action, all Plant 1 SUs met the criteria for unrestricted use.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (Mallinckrodt) (Continued)	
Pre-Design Investigation Data Summary Report, Plants 7 North and 7 South, FUSRAP St. Louis Downtown Site, Rev. 0, September 23, 2004	This report documents the results of a PDI at Plant 7N and Plant 7S. Plant 7N and Plant 7S are located in the southeastern corner of the Mallinckrodt property between Destrehan and Angelrodt Streets. The purpose of the PDI activities was to further refine and delineate areas of radiological contamination identified in previous investigations and to determine by geophysical survey if burial trenches are present on Plant 7S. Samples were also collected for analysis of chemical COCs during the PDI at Plant 7N and Plant 7S. Also included in this report are analytical results for select soil samples collected at two adjacent VPs (DT-10 and DT-12), and two adjacent Mallinckrodt Plants (Plant 7W and Plant 6EH), because these results were used to interpret and estimate the extent of radiological contamination at Plant 7N and Plant 7S.
Residual Dose and Risk Assessment for Plant 10 of the St. Louis Downtown Site (SLDS), Final, August 29, 2005	A residual dose and risk assessment was performed for Plant 10 pursuant to the requirement in the SLDS ROD (USACE 1998a) that states "no further action is required on City Block 1201" (Plant 10) "except to include it in the post-remedial action risk assessment to reconfirm the protectiveness of the removal action there." Soil sampling results, collected as part of the 1995 to 1996 verification process, were used in the assessment. The dose and risk assessment performed for Plant 10 confirms that the site had been protectively remediated and verifies that the selected remedy met the response action objectives regarding dose and risk criteria. The report concludes that Plant 10 meets the criteria for unrestricted use.
Final Status Survey Evaluation for the Accessible Soils within the St. Louis Downtown Site Vicinity Properties West of Broadway, Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots, Rev. 0, May 25, 2006	This report documents the FSS at Mallinckrodt Plants 3, 8, 9, 11, and parking lots, and the West of Broadway VPs (OJM VP [DT-36], Dillion VP [DT-27], UAAA Local 1887 VP [DT-26], Eirten's Parlors VP [DT-25], Bremen Bank VP [DT-24], Worth Industries VP [DT-23], Tobin Electric VP [DT-22], Farve VP [DT-21], Richey VP [DT-20], Challenge Enterprises VP [DT-28], Midtown Garage VP [DT-29], and Zamzow Manufacturing VP [DT-30]). A risk and dose assessment was performed and it was concluded that residual risk and dose for the properties addressed by this report are protective for all potential receptor scenarios. The report concludes that the accessible areas at the West of Broadway VPs and at Mallinckrodt Plants 3, 8, 9, 11, and parking lots meet the criteria for unrestricted use.
Plant 6 West Half Phase 2B Remedial Action Work Area-Specific Description and Design Package, FUSRAP St. Louis Downtown Site, Rev. 0, September 25, 2007	This WASD provides detailed guidance for conducting remediation activities in the Phase 2B portion of Plant 6WH. The Phase 2B area comprises approximately 67,160 ft^2 (6,239 m^2) west of Building 101. It included a 500,000-gallon fuel oil AST and associated appurtenances, a fire pump house (Building 100), a guard shack, and an open asphalt-paved lot. The Phase 2B RD included gross excavation depths ranging from 0 to 14 ft (0 to 4.3 m) bgs.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLDS (Mallinckrodt) (Continued)	
Post-Remedial Action Report and Final Status Survey Evaluation for the Accessible Soils Within the St. Louis Downtown Site Northeast Corner of Plant 9 and Security Gate Number 49 Area, Rev. 0, November 2, 2010	This report documents the remedial action performed for accessible soil (and consolidated materials uncovered during excavation of accessible soil) and the FSS conducted at the northeast corner of Plant 9 and at the Security Gate Number 49 Area. The northeast corner of Plant 9 is an approximately 722,904 ft^2 (50 m^2) area located adjacent to the City of Venice, Illinois VP (DT-11) to the north and to the Norfolk Southern Railroad VP (DT-3) to the east. The Security Gate Number 49 Area is located east of Plant 10, just north of the intersection of North Second Avenue and Angelrodt Street. This document describes the remediation activities and presents an evaluation of residual site conditions. The results of the FSSE confirm that at completion of the remedial action, all SUs within the Northeast Plant 9 and Security Gate Number 49 Areas met the criteria for unrestricted use.
Covidien Plant 7West – 700 Pad Area, Remediation Activity Work Description, Appendix A.14.1 of the Small Area Remediation Work Area-Specific Description, FUSRAP St. Louis Downtown Site, Rev. 0, March 24, 2011	This report provides detailed guidance for the remedial action addressing the 700 Pad Area at Plant 7W. The 700 Pad is the remaining foundation slab of the General Stores and Maintenance Shops built in 1951 to support historical MED/AEC operations. The RD included demolishing and removing the remaining foundation slab from Building 700 and excavating the contaminated soil located beneath and adjacent to the 700 Pad.
North St. Louis County Sites (ALL)	
Record of Decision for the North St. Louis County Sites, St. Louis, Missouri, Final, September 2, 2005	This USACE document presents the selected remedial action for the North St. Louis County Sites. The North St. Louis County Sites consist of the SLAPS, the SLAPS VPs, and the Latty Avenue Properties (consisting of Futura, the HISS, and the Latty Avenue VPs). The selected remedy addresses soil, sediment, surface water, ground water, and structures contaminated as a result of MED/AEC uranium ore processing activities. The selected remedy was Alternative 5 of the NC FS, Excavation with Institutional Controls for Soils Under Roads, Rail Lines, and Other Permanent Structures.
North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2009, Rev. 0, August 5, 2010 *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2010,* Rev. 0, July 8, 2011 *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2011,* Rev. 0, July 13, 2012 *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2012,* Rev. 0, July 19, 2013 *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013,* Rev. 0, July 21, 2014	These Annual EMDARs for CYs 2009 through 2013 provided an evaluation of the data collected as part of the implementation of the environmental monitoring program for the North St. Louis County Sites. Environmental monitoring is an on-going requirement under CERCLA. North St. Louis County Sites air and radiological monitoring activities were evaluated. CWC surface-water and sediment monitoring were addressed. North St. Louis County Sites storm-water and ground-water monitoring activities were described. A radiological exposure dose assessment was included.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
North St. Louis County Sites (ALL) (Continued)	
Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2009, Rev. 0, December 31, 2008 *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2010*, Rev. 0, February 1, 2010 *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2011*, Rev. 0, January 11, 2011 *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2012*, Rev. 0, December 30, 2011 *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2013*, Rev. 0, December 27, 2012	Annual Environmental Monitoring Implementation Reports were prepared for the North St. Louis County Sites on a CY basis. The reports explain the objectives of the environmental monitoring for CY 2009 through 2013 and define the evaluation criteria that are compared to the results.
Latty Avenue Properties	
Engineering Evaluation/Cost Analysis – Environmental Assessment for the Proposed Decontamination of Properties in the Vicinity of the Hazelwood Interim Storage Site (HISS), Rev. 1, March 1992	This revised DOE EE/CA-EA document was prepared to support interim cleanup measures for the contaminated properties in the Hazelwood and Berkeley, Missouri area. The document analyzed and compared three removal action alternatives. The scope of the recommended alternative was to prepare additional storage capacity at the HISS, to remove contaminated soil from the SLAPS and Latty Avenue VPs, and to transport this material to the HISS for interim storage.
Engineering Evaluation/Cost Analysis (EE/CA) for the Hazelwood Interim Storage Site (HISS), Final, October 1998	This USACE document was prepared in support of the proposed plan to remove radioactively contaminated soil from four interim storage piles, as well as accessible subsurface soil from two Latty Avenue VPs and one contiguous property. Two of the storage piles (main and supplemental) were located at the HISS. The other two storage piles were on the Latty Avenue VP-02(L) (GIFREHC/Stone Container) property and were referred to as the Eastern piles. The document assessed three alternatives, with Alternative 3, Excavation and Disposal, (with all excavated areas backfilled with soil from an approved borrow site) identified as the preferred alternative.
VP-2(L) Building Roof Remediation, Final Status Survey Evaluation Report, Rev. 0, August 31, 2005	This report documents the results of measurements taken during the FSS of the building roof decking and associated vents/penetrations (vents) at the GIFREHC property (VP-02[L]). The FSS was designed to determine the levels and extent of residual radiological contamination on the surface of the roof decking and vents, and compare radiological conditions after roof removal with the site Derived Concentration Guideline Limit.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
Latty Avenue Properties (Continued)	
Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura, Rev. 0, December 6, 2006	This report describes the results of a PDI for radiological and chemical contamination that was performed at the HISS and Futura properties. The PDI results and historical data were used to assess the horizontal and vertical extent of radionuclide and non-radionuclide concentrations above the NC ROD RGs. Radiological contamination at the HISS and Futura sites was defined over a large area, but in general was limited to the upper 5 ft (1.5 m) of soil. Isolated areas where radiological contamination exceeded 5 ft (1.5 m) in depth were identified near the former storage pile locations and other areas where grading and excavation activities are thought to have increased the migration of these contaminants. The report provides information to support the design of excavations, and to identify areas that meet the RGs.
Pre-Design Investigation Summary Report for FUSRAP Coldwater Creek Vicinity Property 08(C) & Latty Avenue Vicinity Properties 01(L), & 40A East, & Parcel 10K530087, Rev. 0, January 12, 2007	This report describes the results of a PDI conducted at the properties designated as VP-01(L), VP-08(C), VP-40A East, and Parcel 10K530087, located at the western end of Latty Avenue in Berkeley and Hazelwood, Missouri. The purpose of this report is to present the data to be used to support development of the design of excavations to remove contaminated soil from the properties. Radiological and non-radiological COCs were considered for Parcel 10K530087, while only radiological COCs were considered for VPs-01(L), 08(C), and 40A East, per the NC ROD.
Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L), Rev. 0, May 7, 2008	The purpose of this PDI report was to present the results of investigations conducted at the property designated as VP-02(L), located at the western end of Latty Avenue in Berkeley, Missouri. The report presents all the available relevant data and provides an estimate of the extent of contamination on the property for use in developing the RD. Both radiological and non-radiological COCs were evaluated.
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087, Rev. 0, May 28, 2010	This report documents and assesses the effectiveness of the remedial action conducted at VP-01(L) and Parcel 10K530087, located at 9151 and 9205 Latty Avenue, Berkeley and Hazelwood, Missouri, respectively. The RD involved excavating eight areas of contamination. Radiological and non-radiological COCs were considered for Parcel 10K530087, while only radiological COCs were considered for VP-01(L). The FSSE demonstrates that the NC ROD RGs have been met and that these properties meet the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
Latty Avenue Properties (Continued)	
Pre-Design Investigation Summary Report for the Latty Avenue Vicinity Property 06(L), Rev. 0, April 5, 2011	This report describes the results of a PDI performed at VP-06(L). VP-06(L) is located at the western end of Seeger Industrial Drive. The PDI results were used to assess the horizontal and vertical extent of radionuclide contamination. Radiological contamination was identified in a small area less than 1 ft (0.3 m) in depth in the northwest corner of VP-06(L).
Addendum to the Pre-Design Investigation Summary Report for FUSRAP Latty Avenue Vicinity Property 02(L) – Building Interior and Exterior Data, Rev. 0, April 4, 2012	This addendum presents the survey measurements and sample data collected during investigation of the interior and exterior building structure surfaces at VP-02(L). Based on the surveys and sampling results, areas on structure surfaces were identified that required remediation.
Addendum to the Pre-Design Investigation Summary Report for Hazelwood Interim Storage Site and Futura – Building Interior and Exterior Data, Rev. 0, April 5, 2012	This addendum presents the survey measurements and sample data collected during investigation of the Futura site interior and exterior building structure surfaces. The survey measurements and sampling included radiological scan surveys, fixed-point measurements, and/or media sampling (i.e., dust, insulation, dirt, drain, sediment). The investigation focused on areas such as the interior and exterior walls, roof surfaces, gutters, floor surfaces, interior wall panel insulation, horizontal surfaces in the overhead areas, and floor drains. Based on the surveys and sampling results, areas on structure surfaces were identified that required remediation.
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 03(L), 04(L), 05(L) and 06(L), Rev. 0, September 27, 2012	This report documents and assesses the effectiveness of the remedial action conducted at VP-03(L), VP-04(L), VP-05(L), and VP-06(L). These properties are located south of Latty Avenue, in Berkeley, Missouri. The response action conducted at VPs 03(L), 04(L), 05(L), and 06(L) consisted of a single-phased remedial action on VP-04(L). The results of the FSSE confirm that at completion of the remedial action, all properties met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L), Rev. 0, December 21, 2012	This report documents and assesses the effectiveness of the remedial action conducted at VP-02(L). VP-02(L) is located east of the HISS and north of VP-40A, at 9150 Latty Avenue in Berkeley, Missouri. In general, for soil areas, remedial activities included excavating previously identified areas of contamination, backfilling the excavation with approved borrow, and restoring the soil surface. For structures and sewers, remediation involved sweeping, wiping, power-washing, and vacuuming previously identified areas of contamination. The results of the FSSE confirm that at completion of the remedial action, VP-02(L) met the criteria for UUUE.
Vicinity Property 01(L) Building Interior Decontamination Plan, FUSRAP North St. Louis County Sites, Rev. 0, April 5, 2013	This plan describes the remedial actions to be taken to address the interior building surfaces of three buildings at VP-01(L): the Main Building, Meter House, and Boiler House. It identifies the primary and alternative surface decontamination methods to be used.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
Latty Avenue Properties (Continued)	
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (Partial), Rev. 0, August 13, 2013	This report documents the PDI and FSSE conducted at VP-40A (Partial). The majority of VP-40A (partial) is owned by Norfolk Southern Corporation and used as a commercial railroad. The location of VP-40A can be described as winding through the commercial/industrial section of the North St. Louis County Sites and branching out at as the railroad tracks follow different paths. The PDI was conducted to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that VP-40A (partial) meets the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site, Rev. 0, September 25, 2013	This report documents and assesses the effectiveness of the remedial action conducted at the HISS. It describes the removal and remediation activities and presents an evaluation of residual site conditions. Both radiological and non-radiological COCs were considered. The report concludes that the HISS meets the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Property Futura, Rev. 0, September 4, 2014.	This report documents and assesses the effectiveness of the remedial action conducted at Futura. It describes the removal and remediation activities and presents an evaluation of residual site conditions. Both radiological and non-radiological COCs were considered. The report concludes that Futura meets the criteria for UUUE.
St. Louis Airport Site (SLAPS)	
St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA), Final, September 1997	This DOE document developed a proposed action to address the presence of residual radioactive material in the soil of the SLAPS. Three alternatives were assessed. The document identified Alternative 3, Removal of Radioactively Contaminated Soil and Off-site Disposal, as the preferred alternative to accomplish the stated goals and objectives of the analysis.
Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS) and Action Memorandum, Final, March 1999	This USACE document was prepared in support of the proposed plan to remove radioactively contaminated soil from the SLAPS, including the open fields north of McDonnell Boulevard (called the Ballfields) that correspond to IA-09. The document assessed three alternatives against a range of possible cleanup criteria and future uses. Alternative 2C, Excavation and Disposal of the SLAPS and the Ballfields (with backfill of clean material from an approved off-site source), was identified as the preferred alternative consistent with the anticipated final remedy for the site.

Table A-1. Summary of Documents Reviewed (Continued)

SLAPS	
Site Wide Removal Action Work Plan, FUSRAP St. Louis Airport Site, Addendum 1 to Rev. 0, March 3, 2000	This report provides overall site guidance for removal action and related activities at the SLAPS. The RAWP includes plans and drawings, as well as narratives that address site-wide maintenance (environmental monitoring, dust control, water management, surveying, etc.) and construction note and specifications common throughout the site (backfilling and restoration, etc.).
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site, Includes Investigation Areas 01 Through 07, Investigation Area 08: South Ditch, Parts of Investigation Areas 11 and 12, and Coldwater Creek: West of IA-01, Rev. 0, May 14, 2009	This report documents and assesses the effectiveness of the remedial action conducted at the SLAPS. It describes the removal and remediation activities and presents an evaluation of residual site conditions. At completion of the remedial action, accessible soil within the SLAPS SUs met the criteria for UUUE.
SLAPS VPs	
Post-Remedial Action Report for the St. Denis Bridge Area, Final, July 1999	This report documents the remedial action activities accomplished in conjunction with the replacement of the St. Denis Street Bridge over CWC in Florissant, Missouri. Details of the remedial action (excavation of the creek bank, transportation and off-site disposal of contaminated material) are included, as well as post-remedial action activities (sampling and verification).
Vicinity Property 38 Removal Action Summary, Final, April 9, 2001	VP-38 is located at 8945 Latty Avenue in Berkeley, Missouri, on Supervalu, Inc. property. The removal action performed at VP-38 included not only removal and disposal of contaminated material, but also the installation of a sewer line associated with the relocation of the USACE Office Trailer Complex. Site work was initiated in November 1999, with all work accepted in August 2000. This Removal Action Summary contains a chronology of activities, lessons learned, project costs, and soil volumes tables.
Final Status Survey Evaluation for the SLAPS Vicinity Property 27, Rev. 0, March 30, 2006	This document presents the survey design, data quality assessment, and results for the FSSE of SLAPS VP-27. VP-27 is located on the southwest corner of the intersection of Frost Avenue and Romiss Court. The FSS consisted of a GWS and the collection of biased and systematic soil samples. VP-27 was evaluated as one Class 2 SU, which consisted of VP-27, the associated Frost Avenue ROW, and the associated Romiss Court ROW. No contamination in excess of the soil RGs was encountered on VP-27. The report concludes that VP-27 meets the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Pre-Design Investigation Summary Report—FUSRAP St. Louis Airport Site Vicinity Properties 9, 10, 11, and 12, Investigation Area 10 Hotspot, and the Ballfield Hotspot Located within Investigation Area 9 North St. Louis County Sites, Rev. 0, November 3, 2009	This report documents an investigation of potential residual radioactivity on a set of properties near the Lambert-St. Louis International Airport. These properties include SLAPS VPs 9, 10, 11, and 12, IA-10 Hotspot, and the Ballfield Hotspot located within IA-09. This document includes historical, characterization, PDI, and excavation sampling information, as well as gamma radiation survey results for the properties. The purpose of this PDI report is to aid in the design of soil excavation and clean backfill on the subject properties in order to meet the RGs established in the NC ROD. In addition to providing an estimate of the vertical and horizontal extent of radiological contamination in soil at all properties, the report also evaluates non-radiological contamination in soil at IA-09 and IA-10. No non-radiological COCs were identified for the remaining properties in the NC ROD.
Pre-Design Investigation and Final Status Survey Evaluation for the SLAPS Vicinity Properties 21, 22, 23, 24, 26, 28, 29, 30 and 31, Rev. 0, May 7, 2008	This report documents the PDI and FSSE conducted at several properties near the Lambert – St. Louis International Airport. As a group, these properties are referred to as the Frost Avenue VPs and include SLAPS VPs 21, 22, 23, 24, 26, 28, 29, 30, and 31. These properties are generally located on either side of Frost Avenue between the Norfolk-Southern railroad tracks on the west side and I-170 on the east side. The PDI was conducted at these properties to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.
Pre-Design Investigation Summary Report, Investigation Area (IA)-09: Ballfields, IA-08: North Ditch, IA-09: North Ditch, and Ballfields: North of IA-09, North St. Louis County Sites, Rev. 0, October 23, 2008	This report documents the results of the PDI activities performed at the SLAPS VPs IA-09: Ballfields, IA-08: North Ditch, IA-09: North Ditch, and Ballfields: North of IA-09. The purpose of the investigation was to further delineate the horizontal and vertical extent of radiological and non-radiological COCs. The report presents and evaluates the historical and PDI data to support preparation of an RD for the subject properties.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 17, 18, 19, 20, 20A, and 25, Rev. 0, August 12, 2009	This report documents the PDI and FSSE conducted at several properties near the Lambert – St. Louis International Airport. As a group, these properties are referred to as the Southwest Frost Avenue VPs and include SLAPS VPs 17, 18, 19, 20, 20A, and 25. These properties are generally located on the south side of Frost Avenue between the Norfolk-Southern railroad tracks and a CWC tributary to the west and VP-26 to the east. The PDI was conducted at these properties to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.
Pre-Design Investigation Summary Report for the St. Louis Vicinity Property 63, Rev. 0, August 13, 2009	This report documents the results of the PDI activities performed at VP-63. The PDI was conducted to refine and delineate areas of known and suspected radiological contamination. The report identifies one small area located near Pershall Road in the VP-63 ROW that did not meet the NC ROD RGs.
Pre-Design Investigation Summary Report for the Right-of-Way adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 53, 54, and 55, Rev. 0, August 14, 2009	This report documents the results of the PDI activities performed at VP-53, VP-54, VP-55, and the ROW adjacent to Hazelwood Avenue from Pershall Road to Frost Avenue. These VPs are collectively referred to as the Hazelwood Avenue VPs. The PDI was conducted to further refine and delineate areas of known and suspected radiological contamination at these properties. Based on the PDI sampling results, 16 areas did not meet the NC ROD RGs. The areas that exceeded RGs were relatively small and near the adjacent roadway.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51 and 52, Rev. 0, September 18, 2009	This report documents the PDI and FSSE conducted at several properties located east of Hazelwood Avenue, south of Pershall Road, north of Nyflot Avenue, and west of Hanley Road. As a group, these properties are referred to as the Northeast Hazelwood Avenue VPs and include VPs 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51, and 52, and the Hazelwood Avenue ROW adjacent to each applicable property. The PDI was conducted at these properties to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Properties 03, 04, 05, and 06, Rev. 0, October 22, 2009	This PDI report presents the results of the PDI conducted at VPs 03, 04, 05, and 06, and associated ROWs located adjacent to McDonnell Boulevard and Lindbergh Boulevard in Hazelwood, Missouri. The report presents all the available relevant data and provides an estimate of the extent of contamination on the properties for use in developing the RD. Based on the results of the PDI, a small area located along the VP-06 - VP-05 fence line was identified that exceeded the NC ROD RGs.
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Properties 9, 10, 11, and 12, Investigation Area 9 Ballfield Hotspot, and Investigation Area 10 Hotspot, Rev. 0, November 3, 2009	This report documents the results of the PDI activities performed at VP-09, VP-10, VP-11, VP-12, the IA-09 Ballfield Hotspot and the IA-10 Hotspot. These properties are generally located north of McDonnell Boulevard and the SLAPS. Radiological RGs apply to the all of the subject properties, while non-radiological RGs apply only to the IA-09 Ballfield Hotspot and the IA-10 Hotspot. The information presented in this report indicates that remediation is needed to address several areas where COCs were found in excess of the NC ROD RGs.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the SLAPS Vicinity Properties 33, 34, and 37, St. Louis, Missouri, Rev. 0, September 23, 2010	This report documents the PDI and FSSE conducted at SLAPS VPs 34, 35, and 37. These properties are located along Hazelwood Avenue, north of Seegar Industrial Drive and south of Latty Avenue. The PDI was conducted at these VPs to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for Hazelwood Avenue, the Right-of-Way Adjacent to Hazelwood Avenue (Partial) and St. Louis Airport Site Vicinity Properties 32, 35, 35A, 36, 39, 40, 42 and 47, Rev. 0, September 28, 2010	This report documents and assesses the effectiveness of the remedial action conducted at a group of properties generally referred to as the Hazelwood Avenue VPs. The properties include Hazelwood Avenue, the ROW adjacent to Hazelwood Avenue (partial), and SLAPS VPs 32, 35, 35A, 36, 39, 40, 42, and 47. These properties are located along Hazelwood Avenue between Frost Avenue and Pershall Road in Hazelwood and Berkeley, Missouri. In general, for soil areas, remedial activities included excavating previously identified areas of contamination, backfilling the excavation with approved borrow, and restoring the soil surface. The majority of the contaminated soil was removed from the Hazelwood Avenue ROW. In addition, small amounts of contaminated soil were removed from VP-39 and VP-40. The results of the FSSE confirm that at completion of the remedial action, the Hazelwood Avenue VPs met the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
North St. Louis County Frost Avenue Right-of-Way Remedial Design/Remedial Action Work Description, Rev. 0, February 11, 2011	This report provides detailed guidance for the remedial action addressing the Frost Avenue ROW. The Frost Avenue ROW runs in an east-west direction between Eva Avenue and Hazelwood Avenue, and is located in Berkeley, Missouri. The RD consisted of removal of soil with contamination exceeding the NC ROD RGs in the ROW and subsequent restoration work.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 03 and 04, Rev. 0, June 24, 2011	This report documents the PDI and FSSE conducted at VP-03 and VP-04. These properties are located at the corner of McDonnell Boulevard and Lindbergh Boulevard. The PDI was conducted at these VPs to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 08 and 09, Rev. 0, August 3, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-08 and VP-09. These properties are located north of McDonnell Boulevard in Hazelwood, Missouri. The response action conducted at these two VPs included excavation of one area of contamination that had been previously identified, backfill with approved borrow, and surface restoration. This area was located in the northwest portion of VP-09 and the southeast portion of VP-08. The results of the FSSE confirm that at completion of the remedial action, the properties met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 05 and 06, Rev. 0, August 3, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-05 and VP-06. These properties are located near the intersection of McDonnell Boulevard and Lindbergh Boulevard in Hazelwood, Missouri. The response action conducted at these properties included excavation of one area of contamination that had been previously identified, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, the properties met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 53, Rev. 0, August 15, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-53. VP-53 is located at the intersection of Hazelwood Avenue and Pershall Road in Hazelwood, Missouri. The response action conducted at this property included excavation of one area of contamination that had been previously identified, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-53 met the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 63, Rev. 0, September 8, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-63. VP-63 is generally located north of McDonnell Boulevard and south of Pershall Road along Lindbergh Boulevard, in Hazelwood, Missouri. The response action conducted at this property included excavation of one identified area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-63 met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 54, Rev. 0, December 12, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-54. VP-54 is generally located on the south side of Pershall Road in Hazelwood, Missouri. The response action conducted at this property included excavation of one small previously identified area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-54 met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for St. Louis Airport Site Vicinity Property 55, Rev. 0, December 12, 2011	This report documents and assesses the effectiveness of the remedial action conducted at VP-55. VP-55 is generally located on the south side of Pershall Road, in Hazelwood, Missouri. The response action conducted at this property included excavation of one previously identified area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-55 met the criteria for UUUE.
Pre-Design Investigation Summary Report for the St. Louis Airport Site Vicinity Property 16 and the Eva Loadout Facility, Rev. 0, April 19, 2012	This report documents the results of the PDI performed at VP-16 and the Eva Loadout Facility. The Eva Loadout Facility is located on the northeastern corner of the intersection of McDonnell Boulevard and Eva Road. VP-16 is located northeast of the Eva Loadout Facility. The PDI results identified one area on VP-16 and five areas at the Eva Loadout Facility where radiological COCs exceeded the NC ROD RGs. The information presented in this report demonstrates that remediation is required for surface and subsurface soil on VP-16, surface and subsurface soil west of the Norfolk Southern Railroad, and surface and subsurface soil beneath the Norfolk Southern Railroad.
Pre-Design Investigation Work Plan, Coldwater Creek: Northwest of Investigation Area-09 and Investigation Area-10, St. Louis Airport Site Vicinity Properties, FUSRAP North St. Louis County Sites, Rev. 0, November 1, 2012	This report provides overall guidance for investigation activities to be conducted at IA-10 and along a portion of CWC beginning where CWC intersects with the southern edge of McDonnell Boulevard and ending where CWC intersects with the Byassee Road ROW. Radiological and non-radiological COCs were considered for IA-10, while only radiological COCs were considered for the CWC area northwest of IA-09. The work scope includes the collection of soil and sediment samples from systematic locations, the collection of soil and sediment samples from locations identified based on historical information, and the performance of GWSs.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Remedial Action Summary for the Frost Avenue Right-of-Way, FUSRAP North St. Louis County Sites, St. Louis, Missouri, Final, January 30, 2013	This remedial action summary (RAS) describes the January 2012 remediation of an area between the edge of the pavement of Frost Avenue and the projected property line of the adjoining VP-21. It includes a chronology of activities, lessons learned, project costs, and the soil volumes.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 60, 61, and 62 and Parcels 09K130104A and 09K130104B, Rev. 0, July 30, 2013	This report documents the PDI and FSSE conducted at VP-60, VP-61, and VP-62, and Parcels 09K130104A and 09K130104B. These properties are generally located adjacent to each other, southeast of Pershall Road and northeast of Ford Lane, in Hazelwood, Missouri. The PDI was conducted at these properties to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 10, 11, and 12, Rev. 0, September 5, 2013	This report documents and assesses the effectiveness of the remedial action conducted at VP-10, VP-11, and VP-12. These properties are located at the intersection of McDonnell Boulevard and Byassee Drive, in Hazelwood, Missouri. A removal action was conducted at VP-10 in CY 2003. The remedial action conducted at these VPs included excavation of one area of contamination at VP-12, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, the properties met the criteria for UUUE.
Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 09(C), 10(C), and the Road Right-of-Way (Partial), Rev. 0, September 18, 2013	This report documents the PDI and FSSE conducted at VPs 09(C), 10(C), and the portion of the Road ROW directly adjacent to the southern border of VP-10(C). These properties are located to the west of CWC, less than one-half mile downstream from the SLAPS and just upstream of the HISS, and are within the 100-year floodplain of CWC. The PDI was conducted at these properties to further refine and delineate areas of known and suspected radiological contamination. When it was determined that no remedial action would be necessary at these properties, an FSSE was conducted using MARSSIM procedures to ensure that any residual radioactivity does not exceed the criteria specified in the NC ROD. The information presented in this report demonstrates that these properties meet the criteria for UUUE.

Table A-1. Summary of Documents Reviewed (Continued)

Document Name	Summary
SLAPS VPs (Continued)	
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 31A, Rev. 0, September 18, 2013	This report documents and assesses the effectiveness of the remedial action conducted at VP-31A. VP-31A is generally located north of Frost Avenue, between Hazelwood Avenue to the west and I-170 to the east, in Hazelwood, Missouri. The response action conducted at this property included excavation of one small area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-31A met the criteria for UUUE.
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority, Rev. 0, September 27, 2013	This report documents and assesses the effectiveness of the remedial action conducted at IA-13. IA-13 is a narrow strip of land bordered to the north by Banshee Road and to the south by STLAA property, and extending from Boeing property (Boeing Wastewater Treatment Plant) on the west to McDonnell Boulevard on the east. The response action conducted at this property included excavation of one identified area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, IA-13 met the criteria for UUUE.
Remedial Action Summary for the Abandoned Culvert Pipe at the St. Louis Airport Site Vicinity Property Investigation Area-13: Airport Authority and Banshee Road, Rev. 0, December 19, 2013	This report is a supplement to the *Remedial Action Summary for IA-13: Airport Authority.* It describes the remediation of a segment of an abandoned culvert pipe located south of Banshee Road, approximately 150 ft (45.7 m) west of the intersection of Banshee Road and McDonnell Boulevard. This segment of the culvert pipe was situated approximately 2 ft (0.6 m) bgs. The response action conducted at this property included excavation and removal of sections of the pipe and surface restoration.
Pre-Design Investigation Summary Report for Coldwater Creek from McDonnell Boulevard to Frost Avenue, Rev. 0, March 31, 2014	This report documents the results of the PDI activities performed along a portion of CWC. The area included encompasses approximately 0.6 miles of CWC, beginning where CWC intersects with the southern edge of McDonnell Boulevard to Frost Avenue. This comprises a portion of what is referred to as Reach A of CWC. The results of the PDI indicated the presence of radiological COCs in excess of the NC ROD RGs in six areas along this portion of CWC. Three areas are located near McDonnell Boulevard, two small areas are located just downstream of McDonnell Boulevard across from where runoff from IA-10 enters CWC, and one additional area is located further downstream across from the Ballfield Hotspot area. The depths of the areas that exceed the NC ROD RGs range from the surface to 5 ft (1.5 m) bgs.
Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Vicinity Property 16, Rev. 0, July 9, 2014	This report documents and assesses the effectiveness of the remedial action conducted at VP-16. The response action conducted at this property included excavation of one identified area of contamination, backfill with approved borrow, and surface restoration. The results of the FSSE confirm that at completion of the remedial action, VP-16 met the criteria for UUUE.

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APPENDIX B

POST-REMEDIATION DATA FROM REMEDIAL ACTIONS CONDUCTED AT THE ST. LOUIS DOWNTOWN SITE

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Table B-1. Radiological Soil Data Summary for the St. Louis Downtown Site

Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G [b, c]	SOR_N [c]
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Background	Surf & Subs	2.78	0.89	0.95	0.17	1.16	0.35	1.94	0.76	1.09	0.29	0.08	0.08	1.44	0.75	0.82	NA
Mallinckrodt Plant 9 and Security Gate Number 49	SU-1 Surf	2.88	1.73	0.70	0.32	0.82	0.45	3.59	2.48	0.88	0.43	0.39	0.55	6.13	8.51	1.04	0.47
	SU-1 Subs	1.98	1.17	0.68	0.23	1.07	0.58	2.21	1.27	0.93	0.53	0.23	0.17	2.71	2.50	0.27	0.08
	SU-2 Surf	1.67	0.75	0.37	0.22	0.60	0.26	2.52	1.02	0.45	0.29	0.23	0.17	3.65	3.06	0.62	0.18
	SU-2 Subs	2.47	1.42	0.81	0.16	1.02	0.36	2.87	1.90	0.93	0.27	0.23	0.34	4.09	4.65	0.35	0.14
Norfolk Southern Railroad (DT-3)	SU-1 Surf	3.39	1.43	0.87	0.30	1.23	0.39	4.16	1.34	0.93	0.35	0.49	0.47	7.11	7.43	0.50	0.27
	SU-1 Subs	2.86	1.35	0.96	0.28	1.16	0.42	3.16	1.56	0.94	0.29	0.20	0.36	3.28	2.32	0.35	0.13
	SU-2 Surf	1.51	0.76	0.27	0.19	0.36	0.31	1.97	1.87	0.19	0.08	0.21	0.23	3.26	4.51	0.53	0.18
	SU-2 Subs	2.98	1.42	0.96	0.29	1.24	0.51	3.02	1.26	1.01	0.41	0.26	0.32	3.81	2.51	0.38	0.15
	SU-3 Surf	1.23	0.41	0.36	0.19	0.56	0.23	1.43	0.55	0.37	0.24	0.03	0.09	0.90	0.41	0.39	0.01
	SU-3 Subs	2.91	2.40	0.88	0.40	1.17	0.46	2.93	2.09	1.03	0.50	0.26	0.35	3.45	4.20	0.36	0.14
Gunther Salt Company VP (DT-4)	SU-1N Surf	2.62	2.00	0.65	0.35	0.94	0.45	2.45	1.42	0.71	0.33	0.41	0.64	7.00	11.30	0.38	0.18
	SU-1N Subs	2.28	0.97	0.67	0.22	0.98	0.41	2.05	0.71	0.82	0.22	0.17	0.16	3.03	2.38	0.28	0.06
	SU-2N Surf	3.36	1.56	0.99	0.28	1.32	0.54	3.34	1.81	1.00	0.37	0.68	0.73	12.63	13.41	0.57	0.34
	SU-2N Subs	4.16	3.27	0.73	0.41	1.11	0.31	2.30	1.63	1.13	0.36	0.37	0.62	5.59	10.96	0.49	0.25
	SU-3N Surf	2.08	1.42	0.73	0.33	1.06	0.40	3.31	2.39	0.93	0.41	0.49	0.63	9.85	14.06	1.07	0.48
	SU-3N Subs	2.72	1.25	0.87	0.27	1.26	0.32	4.04	1.66	1.00	0.32	0.45	0.40	6.01	6.11	0.47	0.25
	SU-1S Surf	3.52	1.24	0.92	0.11	1.32	0.36	3.44	0.98	0.89	0.27	0.19	0.16	4.18	1.35	0.40	0.16
	SU-1S Subs	2.25	1.56	0.79	0.23	0.98	0.35	2.13	1.41	0.98	0.41	0.13	0.15	2.09	1.48	0.27	0.07
	SU-2S Surf	2.12	0.86	0.48	0.25	0.68	0.34	2.11	0.94	0.58	0.30	0.08	0.21	1.82	0.87	0.63	0.10
	SU-2S Subs	3.07	2.15	0.85	0.29	1.09	0.42	2.88	1.51	0.99	0.36	0.16	0.27	3.09	2.71	0.35	0.13
	SU-3S Surf	2.61	1.35	0.92	0.26	1.17	0.49	2.73	0.77	1.05	0.39	0.17	0.16	2.66	1.47	0.33	0.10
	SU-3S Subs	2.86	2.32	0.97	0.32	1.14	0.35	2.68	1.84	1.02	0.40	-0.01	0.11	2.46	1.33	0.33	0.10
	SU-4S Surf	1.07	0.54	0.35	0.24	0.61	0.46	1.92	0.90	0.51	0.56	0.12	0.10	1.49	1.09	0.53	0.10
	SU-4S Subs	2.03	1.08	0.87	0.29	1.27	0.49	2.84	1.10	1.02	0.42	0.17	0.11	2.21	1.23	0.31	0.10
	SU-5S Surf	0.91	0.37	0.43	0.20	0.70	0.35	1.87	0.82	0.69	0.27	0.09	0.04	1.11	0.54	0.54	0.06
	SU-5S Subs	1.82	1.15	0.79	0.28	1.14	0.32	2.59	0.98	1.01	0.37	0.12	0.11	1.94	0.91	0.29	0.08

Table B-1. Radiological Soil Data Summary for the St. Louis Downtown Site

Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
PSC Metals VP (DT-8)	SU-1 Surf	3.34	1.19	0.87	0.30	1.07	0.43	3.12	1.29	0.82	0.29	0.17	0.48	5.05	4.80	0.66	0.26
	SU-1 Subs	4.09	1.26	1.12	0.22	1.20	0.41	3.39	1.77	1.06	0.44	0.23	0.32	4.25	2.84	0.46	0.19
	SU-2 Surf	1.90	0.92	0.84	0.20	1.15	0.46	2.17	1.24	0.90	0.21	0.42	1.08	9.52	20.52	0.41	0.20
	SU-2 Subs	2.20	0.89	1.03	0.29	1.19	0.25	2.18	1.53	1.06	0.30	0.41	0.63	6.91	10.97	0.39	0.17
	SU-3 Surf	2.21	1.52	1.08	0.28	1.29	0.37	2.11	1.15	1.08	0.34	0.14	0.29	3.70	3.87	0.33	0.11
	SU-3 Subs	1.68	1.20	1.10	0.23	1.49	0.48	1.93	0.96	1.22	0.36	0.15	0.54	3.64	10.18	0.30	0.10
	SU-4 Surf	4.36	2.39	0.95	0.20	1.28	0.47	3.70	1.95	1.19	0.46	0.24	0.24	3.14	1.50	0.45	0.20
	SU-4 Subs	3.31	2.22	0.92	0.31	1.23	0.29	3.33	1.66	1.13	0.24	0.05	0.18	2.83	1.74	0.38	0.15
	SU-5 Surf	2.08	1.45	0.68	0.21	1.08	0.40	2.07	1.10	0.76	0.25	0.14	0.13	1.86	1.05	0.24	0.05
	SU-5 Subs	3.88	3.51	1.11	0.20	1.60	0.72	3.67	2.86	1.14	0.33	0.35	0.49	6.83	9.71	0.51	0.27
	SU-6 Surf	2.93	2.70	1.04	0.29	1.46	0.66	2.84	2.32	1.13	0.36	0.18	1.02	3.96	18.70	0.37	0.14
	SU-6 Subs	1.95	0.93	0.91	0.22	1.25	0.38	2.11	0.90	1.00	0.27	0.15	0.25	2.46	3.25	0.27	0.06
	SU-7 Surf	2.77	1.53	0.88	0.27	1.17	0.48	2.50	1.37	1.10	0.43	0.09	0.13	2.76	1.53	0.33	0.10
	SU-7 Subs	2.09	1.12	0.95	0.21	1.20	0.38	1.96	1.09	1.20	0.27	0.04	0.16	1.65	0.78	0.26	0.05
	SU-8 Surf	1.37	0.99	0.51	0.91	0.78	1.34	1.43	1.28	0.71	1.23	0.05	0.05	1.02	0.71	0.36	0.04
	SU-8 Subs	3.34	5.23	0.75	0.33	0.98	0.44	3.08	5.73	0.77	0.40	0.03	0.21	1.91	1.27	0.37	0.17
	SU-9 Surf	1.82	1.05	0.41	0.21	0.69	0.80	1.66	1.29	0.53	0.36	0.08	0.08	1.35	1.04	0.53	0.08
	SU-9 Subs	1.85	1.00	0.69	0.31	0.95	0.40	1.84	0.62	0.76	0.29	0.12	0.10	1.85	0.87	0.23	0.03
	SU-10 Surf	1.15	0.52	0.35	0.23	0.50	0.31	1.25	0.73	0.42	0.31	0.07	0.10	1.61	1.35	0.38	0.03
	SU-10 Subs	2.20	1.86	0.77	0.27	1.00	0.39	2.16	1.37	0.92	0.52	0.16	0.26	2.38	2.51	0.28	0.08
	SU-11 Surf	1.37	0.64	0.28	0.14	0.46	0.23	1.66	0.79	0.36	0.30	0.09	0.10	1.26	0.67	0.36	0.04
	SU-11 Subs	3.28	1.97	0.73	0.52	0.98	0.71	3.31	2.23	0.81	0.56	0.28	0.42	4.99	4.92	0.42	0.21
	SU-12 Surf	1.48	0.62	0.54	0.52	0.71	0.63	1.47	0.59	0.61	0.52	0.14	0.23	2.48	2.73	0.51	0.06
	SU-12 Subs	2.36	1.00	0.78	0.35	0.91	0.37	2.19	1.16	0.94	0.45	0.22	0.46	2.76	1.89	0.29	0.08
	SU-13 Surf	1.82	0.79	0.46	0.36	0.69	0.51	2.00	0.98	0.59	0.42	0.07	0.14	2.14	2.04	0.58	0.11
	SU-13 Subs	2.63	1.25	0.86	0.25	1.14	0.44	2.39	1.16	0.94	0.33	0.17	0.22	2.86	2.45	0.31	0.08
	SU-14 Surf	1.96	1.26	0.39	0.37	0.53	0.48	1.95	0.80	0.54	0.32	0.07	0.13	1.88	1.04	0.59	0.09
	SU-14 Subs	2.45	1.55	0.99	0.36	1.21	0.44	2.51	1.36	1.01	0.33	0.20	0.33	3.29	2.71	0.33	0.11
	SU-15 Surf	1.47	0.59	0.50	0.27	0.65	0.41	1.54	0.64	0.61	0.33	0.04	0.10	1.40	0.84	0.22	0.02
	SU-15 Subs	3.66	4.35	0.78	0.40	1.18	0.49	3.87	4.09	0.90	0.57	0.13	0.21	2.63	2.14	0.40	0.20
	SU-16 Surf	1.50	0.62	0.50	0.31	0.67	0.44	1.71	0.97	0.57	0.42	0.09	0.16	1.01	0.72	0.22	0.02
	SU-16 Subs	1.59	0.43	0.70	0.25	0.89	0.43	1.54	0.44	0.85	0.36	0.08	0.17	1.73	0.86	0.21	0.02
	SU-17 Surf	0.98	0.23	0.26	0.24	0.32	0.21	0.84	0.39	0.32	0.24	0.04	0.03	0.69	0.25	0.19	0.00
	SU-17 Subs	1.60	0.61	0.69	0.30	0.86	0.34	1.59	0.61	0.79	0.42	0.11	0.08	1.19	1.07	0.19	0.02
	DT-8 Cover	1.08	0.51	0.19	0.12	0.26	0.15	0.98	0.35	0.22	0.14	0.07	0.11	0.69	0.70	0.26	0.00

Table B-1. Radiological Soil Data Summary for the St. Louis Downtown Site

Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G [b, c]	SOR_N [c]
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
TRRA Soil Spoils Area	SU-1 Surf	2.26	0.42	0.72	0.12	1.09	0.27	2.20	0.69	0.74	0.08	0.09	0.11	1.55	0.15	0.24	0.03
	SU-1 Subs	4.20	2.06	0.89	0.27	1.45	0.48	3.37	0.77	1.26	0.44	0.27	0.15	3.11	1.37	0.43	0.18
	SU-2 Surf	1.85	1.07	0.52	0.33	0.62	0.36	1.77	0.96	0.51	0.29	0.14	0.19	1.64	0.93	0.53	0.08
	SU-2 Subs	2.53	1.21	0.76	0.31	1.01	0.45	2.37	1.15	0.82	0.37	0.10	0.23	2.07	1.12	0.28	0.07
	SU-3 Surf	2.28	1.62	0.60	0.42	0.68	0.25	2.86	3.73	0.58	0.35	0.16	0.28	1.74	1.35	0.82	0.30
	SU-3 Subs	3.39	2.01	0.88	0.38	1.05	0.44	2.59	1.37	0.96	0.56	0.15	0.28	2.98	1.89	0.36	0.12
	SU-4 Surf	1.36	0.61	0.40	0.16	0.58	0.28	1.34	0.61	0.43	0.19	0.07	0.19	1.13	0.73	0.42	0.02
	SU-4 Subs	2.39	1.26	0.83	0.31	1.05	0.37	2.23	1.11	0.92	0.40	0.09	0.19	1.82	1.04	0.27	0.06
Thomas and Proetz Lumber Co. VP (DT-10)	SU-1 Surf	3.56	2.05	0.92	0.22	1.50	0.58	3.46	1.66	1.14	0.48	0.38	0.36	5.52	4.81	0.44	0.21
	SU-1 Subs	3.06	1.05	0.97	0.19	1.32	0.39	2.89	0.99	1.12	0.42	0.20	0.29	3.75	3.93	0.38	0.14
	SU-2 Surf	3.80	1.07	0.86	0.22	1.27	0.23	3.86	1.57	0.82	0.31	0.38	0.37	6.44	6.04	0.47	0.24
	SU-2 Subs	3.27	1.55	0.91	0.21	1.38	0.50	3.07	1.18	1.07	0.31	0.34	0.38	5.19	6.26	0.41	0.17
	SU-3 Surf	1.24	0.77	0.30	0.28	0.53	0.38	3.22	1.98	0.46	0.44	0.16	0.10	2.04	1.35	0.43	0.15
	SU-3 Subs	2.84	1.69	0.85	0.27	1.26	0.42	3.39	1.86	1.02	0.38	0.30	0.33	5.18	6.43	0.41	0.19
Illinois Department of Transportation and MoDOT (DT-11)	SU-1 Surf	1.93	1.33	0.71	0.21	1.10	0.44	2.56	2.33	0.90	0.32	0.17	0.17	2.41	1.74	0.34	0.09
	SU-1 Subs	1.54	0.77	0.77	0.23	1.28	0.53	2.36	1.15	0.98	0.33	0.14	0.18	2.72	3.01	0.28	0.07
	SU-3 Surf	1.44	0.70	0.64	0.28	1.06	0.42	2.05	1.09	0.82	0.34	0.15	0.27	1.70	0.77	0.63	0.11
	SU-3 Subs	1.73	1.19	0.81	0.31	1.09	0.56	1.77	1.19	0.93	0.42	0.09	0.16	1.64	1.41	0.23	0.05
	SU-4 Surf	1.31	0.57	0.39	0.18	0.71	0.34	2.20	0.93	0.54	0.27	0.15	0.14	1.62	0.75	0.59	0.11
	SU-4 Subs	2.22	1.64	0.73	0.29	1.15	0.60	2.89	1.86	0.86	0.35	0.15	0.23	2.95	2.82	0.33	0.12
	SU-5 Surf	1.26	0.72	0.64	0.29	1.06	0.46	2.34	1.10	0.83	0.37	0.21	0.22	2.95	2.98	0.70	0.17
	SU-5 Subs	1.94	1.22	0.78	0.22	1.20	0.46	2.42	2.60	0.93	0.27	0.17	0.20	2.83	2.80	0.31	0.10
	SU-6 Surf	2.52	1.75	0.68	0.27	0.99	0.47	3.35	2.39	0.77	0.37	0.18	0.22	4.24	4.47	0.95	0.41
	SU-6 Subs	2.95	1.23	0.82	0.17	1.14	0.36	4.18	3.67	0.89	0.29	0.26	0.26	4.61	3.24	0.45	0.22
MSD Lift Station VP (DT-15)	SU-1 Surf	0.96	0.12	0.23	0.15	0.29	0.15	1.03	0.38	0.25	0.15	-0.01	0.03	0.81	0.27	0.30	0.00
	SU-1 Subs	1.64	1.13	0.74	0.30	0.94	0.39	1.74	1.06	0.78	0.36	0.00	0.12	1.30	0.77	0.21	0.02
Christiana Court, LLC VP (DT-17)	SU-1 Surf	3.17	1.26	0.86	0.20	1.35	0.58	3.23	1.51	0.87	0.50	0.19	0.18	2.24	1.05	0.34	0.11
	SU-1 Subs	1.30	0.27	0.63	0.23	0.82	0.34	1.39	0.21	0.62	0.28	0.12	0.16	0.99	0.25	0.17	0.00
	SU-2 Surf	1.52	0.69	0.46	0.14	0.61	0.24	2.03	0.46	0.55	0.36	0.10	0.11	2.50	0.68	0.59	0.07
	SU-2 Subs	2.14	1.13	0.81	0.29	1.06	0.45	2.37	1.23	0.92	0.32	0.20	0.21	2.34	1.95	0.28	0.08
Midtown Garage VP (DT-29)	SU-1 Surf	1.39	0.63	0.56	0.34	0.90	0.53	1.98	0.99	0.66	0.36	0.48	0.51	7.84	9.42	0.60	0.18
	SU-1 Subs	2.81	1.70	2.87	1.46	8.13	8.26	0.48	0.51	0.97	0.43	0.86	0.31	1.31	0.54	0.45	0.22
Hjersted VP (DT-34)	SU-1 Surf	1.34	0.53	0.41	0.28	0.55	0.26	1.41	0.39	0.47	0.30	0.07	0.06	1.26	0.72	0.42	0.01
	SU-1 Subs	1.75	0.78	0.76	0.22	1.04	0.30	1.66	0.68	0.97	0.37	0.06	0.10	1.64	0.69	0.22	0.02
Factory Tire Outlet (DT-35) and OJM, Inc. (DT-36)	SU-1 Surf	2.28	1.24	0.80	0.26	0.94	0.34	2.45	1.09	1.01	0.34	0.14	0.17	2.28	1.42	0.51	0.12
	SU-1 Subs	2.33	1.38	1.04	0.22	1.21	0.33	2.26	0.69	1.14	0.31	0.12	0.09	1.93	0.87	0.29	0.06
	SU-2 Surf	1.28	0.17	0.64	0.12	0.95	0.25	1.66	0.35	0.87	0.33	0.05	0.09	1.15	0.25	0.20	0.01
	SU-2 Subs	1.20	0.11	1.02	0.15	1.31	0.37	1.61	0.33	1.20	0.38	0.04	0.10	0.92	0.20	0.21	0.02

Table B-1. Radiological Soil Data Summary for the St. Louis Downtown Site

Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Lange-Stegmann (DT-37)	SU-1 Surf	1.10	0.19	0.37	0.23	0.62	0.37	1.33	0.49	0.46	0.27	0.04	0.06	1.09	0.59	0.39	0.00
	SU-1 Subs	1.70	0.78	0.47	0.26	0.69	0.40	1.87	0.79	0.61	0.35	0.05	0.19	1.09	0.59	0.19	0.02
South of Angelrodt VPs (DT-5, DT-13, DT-14, DT-16, DT-18 and the Second Street Corridor)	SU-1 Surf	1.97	1.32	0.57	0.42	0.77	0.57	1.96	1.07	0.62	0.54	0.20	0.25	3.16	2.82	0.43	0.09
	SU-1 Subs	1.97	1.26	0.85	0.40	0.99	0.37	2.03	0.92	0.86	0.33	0.14	0.26	2.48	2.53	0.26	0.06
	SU-2 Surf	1.09	0.46	0.56	0.32	0.80	0.34	1.64	0.46	0.71	0.36	0.12	0.16	2.40	2.48	0.52	0.04
	SU-2 Subs	2.10	1.56	0.86	0.36	1.24	0.44	2.52	1.28	1.11	0.43	0.06	0.16	2.43	1.61	0.31	0.10
	SU-3 Surf	1.54	0.94	0.49	0.35	0.69	0.46	1.73	1.07	0.62	0.55	0.11	0.13	1.71	1.69	0.42	0.06
	SU-3 Subs	2.16	1.23	0.81	0.34	1.03	0.45	2.41	1.35	0.86	0.34	0.20	0.28	2.62	3.23	0.29	0.08
	SU-4 Surf	1.53	0.87	0.61	0.29	0.87	0.36	1.82	0.95	0.84	0.55	0.10	0.14	1.70	1.03	0.50	0.10
	SU-4 Subs	1.99	0.93	0.90	0.26	1.05	0.39	2.35	1.53	0.97	0.37	0.09	0.18	2.12	1.21	0.28	0.08
St. Louis Dowtown Site VPs West of Broadway, Mallinckrodt Plants 3, 8, 9, 11, and Parking Lots	SU-1 Surf	1.52	0.70	0.41	0.28	0.59	0.32	1.46	0.63	0.44	0.33	0.07	0.20	1.59	1.10	0.45	0.02
	SU-1 Subs	2.08	0.98	0.80	0.33	1.02	0.45	2.44	2.41	0.79	0.41	0.11	0.19	2.13	1.30	0.28	0.08
	SU-2 Surf	1.66	0.77	0.65	0.31	0.92	0.40	1.83	0.72	0.77	0.39	0.09	0.19	1.60	0.91	0.58	0.06
	SU-2 Subs	1.68	1.12	0.82	0.32	1.26	0.80	2.17	1.27	1.00	0.63	0.09	0.19	1.58	1.04	0.26	0.06

[a] All values are gross results (include background). Radionuclide-specific means and standard deviations for each SU were estimated using only MARSSIM data (i.e., data for systematic and random samples). Biased samples are not included in the calculations of means and standard deviations presented.

[b] Gross sum of ratios gross (SOR_G) represents SOR including background; Net sum of ratios (SOR_N) represents SOR after background is subtracted. Both the SOR_G and SOR_N values presented in this table represent the mean values calculated using only MARSSIM-based data (i.e., for systematic and random sample data). Mean SOR_G and SOR_N results do not include data for biased samples. The SOR_G value for background is based on mean background concentrations. Because the SOR_N value is based on background subtraction, the SOR_N for background is not applicable (NA).

[c] The sum of ratios is based on subsurface RGs (15/15/50) for all SUs except those for which SOR values are shaded. The shaded SOR values are based on surface RGs (5/5/50).

Table B-2. Non-Radiological Soil Data Summary for the St. Louis Downtown Site

Area	Statistic	Arsenic	Cadmium
Background	Mean	9.03	0.75
	Standard Deviation	4.6	0.93
	Number of samples	30	30
	Maximum	26.7	3.8
	Detects	30	9
Thomas and Proetz Lumber Co. VP (DT-10)	Mean	25.6	0.8
	Standard Deviation	NA[a]	NA[a]
	Number of samples	2	2
	Maximum	46.7	1.4
	Detects	2	1
ROD RGs			
Soil within upper 4 or 6 ft (1.2 or 1.8 m)		60	17
Soil below 4 or 6 ft (1.2 or 1.8 m)		2,500	400

[a] Not Appropriate due to small sample size

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APPENDIX C

POST-REMEDIATION DATA FROM RESPONSE ACTIONS CONDUCTED AT THE NORTH ST. LOUIS COUNTY SITES

(On CD-ROM on the Back Cover of this Report)

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Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
SLAPS VPs and Latty Avenue Properties	Background	Surf	0.95	0.19	0.91	0.07	1.09	0.32	1.49	0.32	1.07	0.34	0.06	0.06	1.08	0.28	0.32	NA
		Subs	1.15	0.31	1.04	0.14	1.26	0.35	1.83	0.57	1.15	0.35	0.06	0.07	1.27	0.34	0.22	NA
SLAPS VPs	VPs 03 and 04	SU-1 Surf	1.20	0.11	0.89	0.10	1.22	0.51	2.02	0.41	0.93	0.24	0.08	0.08	1.00	0.16	0.40	0.09
		SU-1 Subs	1.27	0.19	0.92	0.25	1.30	0.46	1.83	0.41	0.95	0.40	0.07	0.07	1.01	0.25	0.23	0.02
SLAPS VPs	VPs 05 and 06	SU-1 Surf	1.14	NA	0.97	NA	1.14	NA	1.63	NA	0.65	NA	0.06	NA	1.24	NA	0.21	0.00
		SU-1 Subs	1.25	0.40	0.91	0.11	1.35	0.51	3.66	3.34	0.88	0.24	0.15	0.09	1.52	0.43	0.36	0.16
		SU-2 Surf	1.27	0.21	0.83	0.13	1.39	0.42	3.17	2.15	1.03	0.26	0.03	0.09	1.18	0.42	0.50	0.19
		SU-2 Subs	1.24	1.24	0.89	0.89	1.17	1.17	2.57	2.57	0.96	0.96	0.05	0.05	1.09	1.09	0.28	0.08
		SU-3 Surf	1.06	0.15	0.66	0.18	1.21	0.60	3.14	1.76	0.79	0.43	0.07	0.09	1.02	0.39	0.46	0.15
		SU-3 Subs	1.26	1.26	0.99	0.99	1.72	1.72	2.20	2.20	1.13	1.13	0.00	0.00	1.10	1.10	0.25	0.04
SLAPS VPs	VPs 08 and 09	SU-1 Surf	1.17	0.13	0.88	0.12	1.21	0.37	6.02	8.89	0.96	0.27	0.05	0.10	1.06	0.45	0.50	0.29
		SU-1 Subs	0.95	0.15	0.90	0.09	1.49	0.42	2.84	1.35	1.08	0.25	0.06	0.08	1.49	0.87	0.28	0.08
		SU-2 Surf	0.92	0.13	0.87	0.12	1.38	0.09	3.94	1.45	1.06	0.20	0.10	0.16	1.54	0.26	0.46	0.18
		SU-2 Subs	1.11	0.24	0.95	0.06	1.13	0.21	1.86	0.80	1.09	0.33	0.04	0.14	1.31	0.34	0.22	0.03
		SU-3 Surf	1.28	0.15	0.76	0.08	1.38	0.44	2.32	0.55	1.07	0.27	-0.02	0.13	1.21	0.15	0.26	0.05
		SU-3 Subs	1.33	0.19	0.93	0.10	1.39	0.49	2.57	0.88	1.13	0.32	0.04	0.08	1.39	0.39	0.29	0.07
		SU-4 Surf	1.16	0.17	0.75	0.17	1.37	0.32	2.44	0.62	1.15	0.56	0.07	0.07	1.29	0.24	0.33	0.07
		SU-4 Subs	1.21	0.17	0.95	0.06	1.85	0.68	2.76	0.68	1.01	0.32	0.05	0.18	1.51	0.17	0.29	0.07
SLAPS VPs	VPs 09(C), 10(C), and the Road ROW	SU-1 Surf	1.15	0.17	0.69	0.18	0.93	0.38	2.14	0.68	0.79	0.29	0.04	0.17	0.99	0.44	0.40	0.09
		SU-1 Subs	1.19	0.18	0.87	0.15	1.24	0.45	2.27	1.74	1.03	0.26	0.03	0.09	0.79	0.63	0.25	0.05
		SU-2 Surf	1.27	0.11	0.80	0.12	1.16	0.48	1.89	0.50	1.00	0.34	0.05	0.12	1.17	0.24	0.41	0.10
		SU-2 Subs	1.27	0.13	0.95	0.12	1.39	0.34	1.97	0.48	1.13	0.25	0.02	0.09	1.21	0.35	0.24	0.03
SLAPS VPs	VPs 10, 11, and 12	SU-1 Surf	1.52	0.15	1.04	0.10	1.49	0.45	2.69	1.25	1.08	0.21	0.01	0.18	1.14	0.77	0.30	0.09
		SU-1 Subs	1.53	NA	1.03	NA	1.46	NA	2.16	NA	0.91	NA	-0.16	NA	1.40	NA	0.27	0.05
		SU-2 Surf	1.26	0.28	0.92	0.11	1.22	0.32	4.39	2.75	0.99	0.26	0.06	0.10	1.32	0.37	0.41	0.19
		SU-2 Subs	1.16	0.17	0.96	0.12	1.27	0.29	4.08	4.19	1.09	0.25	0.09	0.09	1.40	0.73	0.38	0.20
		SU-3 Surf	0.87	0.12	0.96	0.06	1.19	0.31	4.69	2.29	1.08	0.23	0.11	0.09	1.53	0.63	0.54	0.24
		SU-3 Subs	1.23	0.17	0.96	0.09	1.23	0.30	2.64	2.68	1.14	0.27	0.07	0.08	1.27	0.52	0.28	0.08
		SU-4 Surf	0.78	0.09	0.85	0.31	1.25	0.47	3.10	2.46	1.04	0.31	0.09	0.10	1.70	0.73	0.41	0.13
		SU-4 Subs	1.37	0.15	0.95	0.17	1.23	0.37	1.67	0.31	1.13	0.36	0.03	0.09	1.37	0.65	0.23	0.02
		SU-5 Surf	1.01	0.16	0.89	0.19	1.30	0.69	6.45	3.33	1.00	0.30	0.11	0.12	1.87	1.42	0.70	0.39
		SU-5 Subs	1.12	0.27	0.93	0.19	1.22	0.31	3.61	6.29	1.06	0.27	0.07	0.10	1.49	1.03	0.35	0.14
		SU-6 Surf	0.85	0.16	0.74	0.31	1.06	0.48	3.05	1.70	0.94	0.27	0.08	0.07	1.17	0.49	0.41	0.12
		SU-6 Subs	1.19	0.21	0.89	0.22	1.15	0.41	1.66	0.54	1.06	0.42	0.05	0.06	1.09	0.38	0.21	0.02
SLAPS VPs	VPs 17, 18, 19, 20, 20A, and 25	SU-1 Surf	1.16	0.24	0.72	0.25	1.17	0.47	2.75	1.04	0.91	0.34	0.07	0.11	1.03	0.45	0.42	0.12
		SU-1 Subs	1.23	0.13	0.95	0.20	1.51	0.46	2.38	0.74	1.05	0.32	0.05	0.09	1.36	0.43	0.27	0.05
		SU-2 Surf	1.35	0.19	0.87	0.14	1.38	0.38	2.41	0.61	1.18	0.34	0.06	0.16	1.47	0.53	0.44	0.14
		SU-2 Subs	1.38	0.31	0.93	0.25	1.54	0.37	2.30	0.53	1.45	0.37	0.05	0.13	1.41	0.49	0.27	0.06
		SU-3 Surf	1.23	0.19	0.77	0.26	1.40	0.61	3.33	1.80	1.03	0.39	-0.01	0.12	1.04	0.51	0.47	0.18
		SU-3 Subs	1.22	0.22	0.90	0.17	1.35	0.44	1.97	0.70	1.07	0.36	0.03	0.11	1.18	0.50	0.24	0.03
		SU-4 Surf	1.31	0.12	0.89	0.13	1.16	0.27	1.91	0.60	1.00	0.23	0.03	0.10	1.14	0.55	0.34	0.08
		SU-4 Subs	1.35	0.25	0.94	0.24	1.35	0.55	1.90	0.43	1.11	0.32	0.05	0.13	1.14	0.41	0.24	0.03
SLAPS VPs	VP-31A	SU-1 Surf	1.14	NA	0.95	NA	1.13	NA	2.21	NA	1.09	NA	0.08	NA	0.15	NA	0.39	0.19
		SU-2 Surf	1.05	0.06	0.92	0.09	1.54	0.19	3.08	0.57	1.12	0.29	0.04	0.05	1.52	0.33	0.46	0.14
		SU-2 Subs	1.08	0.11	1.01	0.10	1.43	0.40	1.87	0.60	1.11	0.22	0.05	0.10	1.11	0.81	0.22	0.02

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
SLAPS VPs	Hazelwood Avenue, the ROW Adjacent to Hazelwood Avenue, and SLAPS VPs 32, 35, 35A, 36, 39, 40, 42, and 47	SU-1 Surf	0.91	0.15	0.83	0.17	1.14	0.24	2.15	0.77	1.14	0.26	0.08	0.06	0.86	0.83	0.35	0.06
		SU-1 Subs	1.19	0.14	1.00	0.07	1.24	0.33	1.71	0.41	0.96	0.26	0.04	0.10	1.12	0.41	0.22	0.02
		SU-2 Surf	1.08	0.11	0.91	0.14	1.29	0.39	1.79	0.41	0.96	0.13	0.01	0.13	1.18	0.24	0.37	0.05
		SU-2 Subs	1.05	0.10	0.94	0.11	1.27	0.36	1.66	0.38	0.96	0.18	0.09	0.07	1.13	0.44	0.20	0.01
		SU-3 Surf	1.17	0.18	0.69	0.28	1.13	0.39	1.68	0.22	0.76	0.22	0.08	0.10	1.13	0.37	0.38	0.06
		SU-3 Subs	1.28	0.19	0.91	0.07	1.29	0.32	1.84	0.53	1.14	0.34	0.07	0.11	1.08	0.39	0.23	0.03
		SU-4 Surf	1.20	0.12	0.94	0.08	1.25	0.32	2.09	0.53	1.03	0.38	0.08	0.13	1.22	0.23	0.41	0.10
		SU-4 Subs	1.30	0.14	1.00	0.10	1.35	0.41	1.74	0.49	1.11	0.39	-0.01	0.10	1.01	0.28	0.22	0.02
		SU-5 Surf	1.32	0.11	0.90	0.11	1.29	0.32	2.24	0.60	0.94	0.28	0.03	0.08	1.28	0.42	0.45	0.13
		SU-5 Subs	1.27	0.11	0.96	0.10	1.41	0.43	1.94	0.52	1.13	0.28	0.10	0.10	1.26	0.41	0.24	0.03
		SU-6 Surf	1.30	0.10	0.94	0.07	1.36	0.30	2.54	1.02	1.06	0.30	0.05	0.07	1.36	0.12	0.47	0.15
		SU-6 Subs	1.25	0.20	0.93	0.13	1.40	0.44	2.08	0.58	1.00	0.34	0.04	0.09	1.22	0.36	0.25	0.04
		SU-7 Surf	1.29	0.15	0.94	0.08	1.28	0.21	1.93	0.41	0.98	0.24	0.00	0.07	1.62	0.79	0.43	0.11
		SU-7 Subs	1.30	0.27	0.98	0.08	1.45	0.54	1.77	0.56	1.11	0.38	0.09	0.13	1.22	0.47	0.23	0.03
		SU-8 Surf	1.26	0.22	0.81	0.21	1.38	0.46	2.24	0.66	0.93	0.28	0.09	0.16	0.71	0.58	0.43	0.12
		SU-8 Subs	1.27	0.15	0.90	0.21	1.24	0.35	1.71	0.42	1.00	0.29	0.07	0.16	0.83	0.78	0.22	0.02
		SU-9 Surf	1.17	0.22	0.77	0.09	1.26	0.38	1.93	0.32	0.94	0.21	0.09	0.09	0.83	0.58	0.39	0.08
		SU-9 Subs	1.31	0.28	0.91	0.13	1.30	0.37	1.87	0.71	1.29	0.29	0.05	0.09	0.98	0.38	0.23	0.04
		SU-10 Surf	1.33	0.20	0.85	0.11	1.30	0.18	2.31	1.63	1.06	0.29	0.17	0.16	1.01	0.46	0.45	0.14
		SU-10 Subs	1.29	0.22	0.86	0.22	1.13	0.31	2.98	3.41	0.95	0.36	0.07	0.16	0.88	0.99	0.31	0.10
		SU-11 Surf	1.14	0.12	0.90	0.07	1.33	0.37	1.65	0.29	1.02	0.18	0.06	0.04	1.09	0.33	0.37	0.05
		SU-11 Subs	1.14	0.11	1.00	0.06	1.14	0.21	1.68	0.25	1.19	0.23	0.11	0.11	0.97	0.17	0.21	0.00
		SU-12 Surf	1.25	0.21	0.70	0.26	1.06	0.36	2.84	2.71	0.90	0.37	0.05	0.08	1.02	0.44	0.47	0.16
		SU-12 Subs	1.40	0.30	0.95	0.10	1.29	0.27	1.65	0.54	1.10	0.21	0.03	0.15	1.01	0.44	0.22	0.03
		SU-13 Surf	1.45	0.22	0.76	0.22	1.12	0.33	2.89	1.72	1.01	0.33	0.05	0.17	1.01	0.56	0.52	0.20
		SU-13 Subs	1.38	0.19	0.87	0.15	1.29	0.36	1.68	0.40	1.10	0.26	0.02	0.11	0.94	0.34	0.22	0.02
		SU-14 Surf	1.51	0.21	0.90	0.07	1.20	0.26	2.11	0.51	1.03	0.29	0.04	0.14	1.23	0.42	0.48	0.16
		SU-14 Subs	1.62	0.26	0.99	0.06	1.26	0.27	1.68	0.42	1.12	0.30	0.07	0.12	1.21	0.41	0.24	0.04
		SU-15 Surf	1.31	0.18	0.81	0.15	1.17	0.25	2.16	1.14	0.99	0.20	0.02	0.10	0.98	0.53	0.44	0.12
		SU-15 Subs	1.33	0.20	0.90	0.14	1.31	0.27	1.87	0.51	1.09	0.21	0.02	0.13	1.08	0.61	0.24	0.03
		SU-16 Surf	1.34	0.24	0.88	0.06	1.26	0.23	2.02	0.61	1.06	0.26	0.03	0.12	1.21	0.52	0.44	0.13
		SU-16 Subs	1.48	0.27	0.98	0.10	1.22	0.32	2.07	1.36	1.19	0.29	0.02	0.11	1.02	0.51	0.26	0.05
		SU-17 Surf	1.46	0.11	0.82	0.13	1.37	0.38	2.87	0.90	1.13	0.29	0.01	0.17	1.07	0.65	0.52	0.21
		SU-17 Subs	1.59	0.19	0.95	0.08	1.17	0.26	1.74	0.31	1.06	0.19	0.08	0.13	1.15	0.48	0.25	0.04
		SU-18 Surf [d]	2.58	0.86	0.96	0.19	1.10	0.32	2.23	0.65	1.02	0.32	0.07	0.18	1.92	0.58	0.36	0.14
		SU-18 Subs [d]	1.98	1.07	1.02	0.16	1.18	0.24	2.00	0.67	1.06	0.21	0.08	0.09	1.69	0.93	0.30	0.09
		SU-18 Cover [d]	1.09	0.54	0.26	0.19	0.36	0.24	1.51	0.86	0.23	0.20	0.03	0.14	0.81	0.62	0.25	0.03
		SU-19 Surf [d]	1.92	0.68	0.81	0.25	0.95	0.37	2.62	1.23	0.90	0.44	0.11	0.15	1.69	0.74	0.35	0.12
		SU-19 Subs [d]	1.66	0.66	1.02	0.09	1.39	0.38	2.10	0.53	1.13	0.24	0.07	0.14	1.40	0.91	0.28	0.07
		SU-19 Cover [d]	0.90	0.27	0.19	0.11	0.31	0.15	2.11	1.49	0.24	0.18	0.03	0.07	0.66	0.31	0.28	0.05
		SU-20 Surf	1.13	0.19	0.93	0.18	1.20	0.29	2.01	1.07	0.97	0.24	0.06	0.09	1.16	0.57	0.39	0.09
		SU-20 Subs	1.35	0.40	0.97	0.13	1.17	0.38	4.40	6.51	1.03	0.27	0.07	0.11	1.10	0.67	0.41	0.20
		SU-21 Surf	1.26	0.25	0.85	0.15	1.08	0.29	2.32	1.41	0.90	0.21	0.06	0.13	1.01	0.49	0.44	0.13
		SU-21 Subs	1.35	0.24	0.98	0.11	1.32	0.32	3.18	3.16	1.10	0.27	0.08	0.12	1.38	0.61	0.33	0.12
		SU-22 Surf [e]	1.36	0.39	0.92	0.18	1.14	0.33	3.29	3.53	1.05	0.31	0.06	0.09	1.51	0.82	0.34	0.13
		SU-22 Subs [e]	1.20	0.13	0.85	0.12	1.21	0.34	3.07	1.95	1.12	0.25	0.07	0.11	1.15	0.41	0.31	0.09

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
SLAPS VPs	VPs 33, 34, and 37	SU-1 Surf	1.39	4.32	0.92	1.43	1.06	1.96	2.25	5.62	1.09	1.77	0.03	0.34	1.14	4.85	0.46	0.15
		SU-1 Subs	1.35	0.12	1.03	0.08	1.33	0.31	1.86	1.83	1.08	0.23	0.06	0.13	1.32	0.47	0.26	0.06
		SU-2 Surf	1.33	0.15	0.94	0.07	1.32	0.25	2.90	0.99	1.11	0.27	0.06	0.09	1.35	0.33	0.50	0.18
		SU-2 Subs	1.99	1.16	1.06	0.17	1.38	0.54	2.26	1.24	1.23	0.26	0.11	0.10	1.54	0.94	0.31	0.11
		SU-3 Surf	1.32	0.16	0.89	0.15	1.05	0.33	2.47	0.95	1.01	0.34	0.01	0.09	0.91	0.39	0.46	0.15
		SU-3 Subs	1.28	0.26	0.98	0.08	1.30	0.43	2.17	1.90	1.07	0.25	0.05	0.08	1.19	0.45	0.25	0.05
		SU-4 Surf	1.33	0.15	0.93	0.10	1.25	0.24	1.99	0.46	1.09	0.17	0.00	0.08	1.82	0.82	0.44	0.13
		SU-4 Subs	1.32	0.26	0.99	0.07	1.46	0.53	1.77	0.55	1.13	0.36	0.08	0.12	1.23	0.46	0.23	0.03
SLAPS VPs	VPs 41, 43, 44, 45, 46, 48, 48A, 49, 50, 51, and 52	SU-1 Surf [e]	1.03	0.15	0.87	0.18	1.10	0.25	1.89	0.44	0.94	0.21	0.09	0.16	1.14	0.83	0.34	0.05
		SU-1 Subs	1.09	0.23	0.97	0.06	1.12	0.23	1.58	0.23	1.10	0.27	0.05	0.08	1.04	0.54	0.20	0.01
		SU-2 Surf	1.27	0.20	0.90	0.13	1.65	0.69	3.58	1.77	1.10	0.31	0.03	0.20	1.15	0.84	0.53	0.22
		SU-2 Subs	1.26	0.15	0.94	0.10	1.48	0.40	2.32	1.00	1.11	0.22	0.05	0.13	1.24	0.58	0.26	0.05
		SU-3 Surf [e]	1.23	0.15	0.87	0.21	1.29	0.39	2.47	1.07	1.02	0.31	0.03	0.10	1.13	0.39	0.43	0.13
		SU-3 Subs	1.26	0.14	0.99	0.08	1.33	0.39	1.66	1.99	1.06	0.23	0.05	0.10	1.21	0.40	0.24	0.04
		SU-4 Surf [e]	1.26	0.20	0.85	0.13	1.38	0.39	2.24	0.61	1.00	0.29	0.02	0.08	1.32	0.20	0.32	0.07
		SU-4 Subs	1.29	0.18	0.95	0.09	1.69	0.39	2.40	0.60	1.05	0.24	0.06	0.10	1.42	0.19	0.27	0.05
SLAPS VPs	VP-53	SU-1 Surf [f]	1.30	0.20	0.94	0.04	1.36	0.23	3.49	2.57	1.02	0.15	0.03	0.07	1.26	0.30	0.34	0.13
		SU-1 Subs	1.07	0.49	0.93	0.07	1.18	0.41	1.18	4.43	0.92	0.08	0.07	0.08	1.16	0.51	0.25	0.09
		SU-2 Surf [e]	1.31	0.26	0.79	0.20	1.28	0.44	2.96	2.00	0.83	0.24	0.05	0.10	1.32	0.94	0.43	0.16
		SU-2 Subs	1.39	0.24	0.99	0.12	1.76	0.65	2.58	1.07	1.15	0.27	0.05	0.12	1.17	0.58	0.29	0.08
		SU-3 Surf [e]	1.54	0.16	1.02	0.08	2.60	0.33	3.72	0.36	1.24	0.27	0.10	0.17	1.09	0.25	0.42	0.18
		SU-3 Subs	1.43	0.24	1.02	0.07	2.39	0.73	3.12	0.77	1.23	0.38	-0.06	0.11	1.47	0.74	0.33	0.12
SLAPS VPs	VP-54	SU-1 Surf [f]	1.13	0.02	1.00	0.04	1.55	0.04	1.77	0.10	1.32	0.14	0.08	0.06	0.50	0.52	0.20	0.00
		SU-1 Subs	1.25	0.10	1.08	0.05	1.67	0.54	2.58	0.48	1.26	0.08	0.16	0.10	1.35	0.44	0.28	0.06
		SU-2 Surf [e]	0.97	0.20	0.92	0.07	1.15	0.22	3.49	2.32	1.01	0.26	0.06	0.04	1.34	0.52	0.46	0.17
		SU-2 Subs	1.29	0.23	1.01	0.04	1.36	0.24	1.98	0.71	1.19	0.24	0.04	0.11	1.18	0.37	0.24	0.04
		SU-3 Surf	1.18	0.12	0.86	0.14	1.29	0.47	2.05	0.53	0.89	0.26	0.06	0.09	1.34	0.26	0.41	0.09
		SU-3 Subs	1.22	0.16	0.96	0.10	1.55	0.37	2.11	0.58	1.00	0.19	0.06	0.08	1.44	0.24	0.25	0.04
SLAPS VPs	VP-55	SU-1 Surf [f]	1.29	0.14	0.89	0.06	1.15	0.33	3.38	1.90	1.10	0.21	0.04	0.06	1.30	0.23	0.34	0.12
		SU-1 Subs	1.03	NA	0.89	NA	0.89	NA	6.89	NA	0.89	NA	0.15	NA	1.08	NA	0.55	0.34
		SU-2 Surf [e]	1.05	0.20	0.79	0.18	1.33	0.20	4.21	5.30	0.96	0.19	0.01	0.18	1.18	0.43	0.51	0.22
		SU-2 Subs	1.12	0.11	0.84	0.17	1.06	0.29	1.93	0.80	0.96	0.37	0.06	0.06	1.18	0.30	0.23	0.02
		SU-3 Surf [e]	1.22	0.09	0.86	0.07	1.31	0.32	1.85	0.37	1.02	0.21	0.07	0.12	1.51	0.22	0.32	0.05
		SU-3 Subs	1.14	0.18	0.87	0.15	1.64	0.42	2.19	0.76	1.03	0.17	0.02	0.09	1.30	0.38	0.25	0.04
SLAPS VPs	VPs 60, 61, and 62 and Parcels 09K130104A and 09K130104B	SU-1 Surf [e]	1.21	0.10	0.89	0.10	1.64	0.26	2.68	0.76	1.01	0.27	0.02	0.15	1.25	0.40	0.42	0.13
		SU-1 Subs	1.35	0.20	0.98	0.10	1.64	0.39	2.30	0.60	1.05	0.23	0.03	0.07	1.33	0.41	0.27	0.05
		SU-2 Surf [e]	1.14	0.11	0.80	0.24	1.53	0.67	2.19	0.56	0.95	0.34	0.06	0.11	1.13	0.37	0.30	0.05
		SU-2 Subs	1.26	0.06	1.00	0.05	1.86	0.61	2.34	0.42	1.22	0.37	0.10	0.13	1.23	0.31	0.26	0.05
SLAPS VPs	VP-63	SU-1 Surf	1.20	0.10	0.74	0.23	1.13	0.25	6.00	4.65	1.02	0.38	0.09	0.07	0.93	0.17	0.69	0.37
		SU-1 Subs	1.27	0.19	0.86	0.19	1.34	0.58	4.70	1.83	1.02	0.35	0.01	0.09	1.05	0.29	0.42	0.20
		SU-2 Surf	1.18	0.25	0.78	0.22	1.03	0.34	3.11	3.29	0.89	0.37	0.04	0.10	1.12	0.47	0.48	0.17
		SU-2 Subs	1.19	0.23	0.88	0.15	1.10	0.29	2.77	3.40	0.96	0.25	0.07	0.08	1.13	0.40	0.29	0.10
		SU-3 Surf	1.29	0.19	0.79	0.17	1.06	0.43	1.75	0.35	0.75	0.19	0.04	0.08	1.14	0.19	0.41	0.09
		SU-3 Subs	1.36	0.18	0.89	0.21	1.32	0.57	1.83	0.46	0.99	0.29	0.08	0.15	0.99	0.47	0.23	0.03

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
SLAPS VPs	IA-13	SU-1 Surf [e]	1.24	0.15	0.91	0.22	1.02	0.30	3.93	2.73	1.02	0.27	0.07	0.12	1.11	0.33	0.40	0.18
		SU-1 Subs	1.41	0.27	0.84	0.15	1.11	0.34	9.53	15.40	0.93	0.28	0.02	0.07	1.32	0.34	0.76	0.54
		SU-2 Surf [f]	1.23	0.06	0.98	0.06	1.25	0.20	2.79	2.34	1.19	0.32	0.07	0.08	1.26	0.33	0.29	0.11
		SU-3 Surf [f]	1.12	0.18	0.88	0.27	1.21	0.43	4.16	5.72	1.08	0.45	0.04	0.12	1.34	0.56	0.38	0.17
		SU-4 Surf [f]	1.26	0.16	1.03	0.18	1.19	0.30	1.99	0.49	1.11	0.30	0.02	0.08	1.16	0.46	0.24	0.03
		SU-5 Surf [f]	1.31	0.16	0.95	0.07	1.13	0.19	2.66	1.97	1.10	0.28	0.06	0.10	1.35	0.46	0.29	0.08
		SU-6 Surf	1.13	0.23	0.69	0.29	0.94	0.47	2.46	2.32	0.78	0.38	0.06	0.07	1.12	0.40	0.42	0.12
		SU-6 Subs	1.26	0.17	0.93	0.16	1.22	0.35	1.78	0.40	1.03	0.26	0.05	0.09	1.17	0.39	0.23	0.02
		SU-7 Surf	1.33	0.17	0.86	0.17	1.18	0.27	5.92	2.65	1.02	0.24	0.06	0.10	1.24	0.48	0.71	0.40
		SU-7 Subs	1.24	0.12	0.98	0.08	1.28	0.29	2.42	1.22	1.06	0.25	0.02	0.12	1.07	0.38	0.27	0.05
		SU-8 Surf	1.22	0.20	0.73	0.24	1.04	0.29	6.15	4.41	1.02	0.26	0.03	0.08	1.10	0.56	0.71	0.39
		SU-8 Subs	1.26	0.15	0.94	0.13	1.11	0.30	1.75	0.38	1.08	0.26	0.09	0.10	1.21	0.82	0.22	0.02
		SU-9 Surf	1.40	0.27	0.93	0.09	1.44	0.37	5.30	3.81	1.12	0.28	0.03	0.13	1.22	0.69	0.68	0.37
		SU-9 Subs	1.31	0.24	0.88	0.24	1.30	0.53	4.13	5.63	1.04	0.27	0.05	0.12	1.23	0.57	0.39	0.18
		SU-10 Surf	1.32	0.17	0.94	0.08	1.26	0.30	6.00	3.51	1.06	0.27	0.06	0.16	1.21	0.53	0.72	0.40
		SU-10 Subs	1.28	0.14	0.95	0.14	1.35	0.34	2.08	0.92	1.13	0.34	0.03	0.14	1.13	0.45	0.25	0.04
		SU-11 Surf	1.29	0.21	0.86	0.24	1.06	0.37	4.14	2.13	0.83	0.29	-0.01	0.11	1.12	0.30	0.58	0.26
		SU-11 Subs	1.40	0.10	0.90	0.10	1.16	0.31	1.65	0.45	1.08	0.20	0.03	0.10	1.05	0.20	0.22	0.02
SLAPS VPs	VPs 01, 02, 07, 13, 14, 15, and IA-11	SU-1 Surf [e]	1.28	0.19	0.86	0.14	1.02	0.35	1.95	0.81	0.93	0.30	0.07	0.08	1.11	0.69	0.31	0.06
		SU-1 Subs	1.42	0.17	0.98	0.19	1.38	0.33	2.00	0.53	1.15	0.23	0.04	0.15	1.26	0.82	0.25	0.04
		SU-2 Surf [e]	0.91	0.05	0.86	0.10	1.25	0.28	1.75	0.33	1.07	0.25	0.08	0.08	0.97	0.44	0.30	0.02
		SU-2 Subs	1.25	0.21	0.98	0.10	1.49	0.34	1.83	0.39	1.13	0.31	0.05	0.08	1.20	0.65	0.23	0.02
		SU-3 Surf [e]	0.88	0.15	0.74	0.19	1.11	0.29	2.12	1.11	0.91	0.27	0.09	0.07	1.03	0.66	0.28	0.05
		SU-3 Subs	1.21	0.22	0.91	0.10	1.33	0.36	2.63	4.40	1.09	0.25	0.05	0.09	1.12	0.37	0.28	0.08
		SU-4 Surf [e]	1.22	0.16	0.79	0.14	1.09	0.31	1.89	0.58	1.02	0.33	-0.01	0.16	1.01	0.46	0.28	0.04
		SU-4 Subs	1.60	0.36	0.99	0.20	1.46	0.46	1.89	0.52	1.23	0.36	0.08	0.22	0.97	0.95	0.25	0.05
		SU-5 Surf [e]	1.56	0.28	1.41	0.44	1.94	0.79	1.53	0.21	1.50	0.69	0.01	0.15	1.40	0.48	0.27	0.05
		SU-5 Subs	1.84	0.86	1.31	0.31	1.73	0.61	2.06	0.97	1.46	0.41	0.10	0.14	1.67	0.90	0.29	0.09
		SU-6 Surf [e]	1.19	0.22	0.88	0.15	1.12	0.24	1.51	0.36	0.98	0.24	0.04	0.08	1.04	0.28	0.33	0.05
		SU-6 Subs	1.18	0.15	0.83	0.13	1.05	0.27	1.63	0.47	0.89	0.26	0.05	0.08	0.91	0.26	0.21	0.01
		SU-7 Surf [e]	1.40	0.11	0.93	0.10	1.30	0.51	1.99	0.56	1.10	0.22	0.04	0.10	1.39	1.11	0.41	0.12
		SU-7 Subs	1.50	0.14	0.97	0.14	1.31	0.44	1.78	0.46	1.01	0.28	0.04	0.10	1.06	0.33	0.24	0.03
		SU-8 Surf	1.42	0.23	0.68	0.22	1.29	0.45	2.37	0.78	0.85	0.32	0.04	0.11	0.87	0.70	0.47	0.16
		SU-8 Subs	1.47	0.20	0.86	0.21	1.62	0.78	2.34	1.01	1.03	0.35	0.05	0.14	1.01	0.64	0.27	0.07
		SU-9 Surf [e]	1.34	0.17	0.88	0.20	1.73	0.63	3.45	1.53	1.02	0.37	0.03	0.19	0.99	0.64	0.48	0.20
		SU-9 Subs	1.36	0.17	0.92	0.20	1.92	0.59	3.16	1.09	1.12	0.28	0.05	0.09	1.02	0.47	0.32	0.11
		SU-10 Surf [e]	1.44	0.16	0.89	0.11	1.70	0.53	2.95	1.45	1.14	0.27	0.05	0.19	1.08	0.50	0.43	0.16
		SU-10 Subs	1.54	0.18	1.00	0.09	2.13	0.61	2.54	0.92	1.26	0.24	0.04	0.12	1.10	0.58	0.29	0.08
		SU-11 Surf [e]	1.29	0.22	0.78	0.24	1.04	0.41	2.21	0.94	0.90	0.27	0.06	0.12	1.15	0.43	0.43	0.13
		SU-11 Subs	1.30	0.17	0.88	0.21	1.17	0.32	1.72	0.57	1.01	0.29	0.04	0.06	1.05	0.26	0.22	0.02
		SU-12 Surf [e]	1.34	0.18	0.90	0.16	1.29	0.43	2.06	0.54	1.08	0.32	0.05	0.11	1.27	0.31	0.31	0.06
		SU-12 Subs	1.42	0.20	0.95	0.17	1.57	0.49	1.90	0.54	1.16	0.27	0.00	0.15	1.16	0.71	0.24	0.04
		SU-13 Surf [e]	0.86	0.15	0.71	0.23	1.10	0.45	1.57	0.42	0.94	0.40	0.07	0.06	0.95	0.55	0.23	0.01
		SU-13 Subs	1.12	0.22	0.91	0.12	1.21	0.34	1.35	1.03	1.02	0.22	0.06	0.07	1.06	0.28	0.19	0.01
		SU-14 Surf [f]	0.88	0.09	0.74	0.18	1.06	0.44	1.61	0.48	1.13	0.38	0.06	0.06	0.79	0.47	0.18	0.01
		SU-14 Subs	1.31	0.25	1.00	0.08	1.53	0.48	1.97	0.35	1.14	0.23	-0.02	0.11	1.33	0.88	0.24	0.04
		SU-15 Surf [e]	1.46	0.18	0.91	0.12	1.44	0.42	2.11	0.80	1.13	0.30	0.03	0.14	1.13	0.54	0.41	0.13
		SU-15 Subs	1.36	0.25	0.91	0.18	1.41	0.49	1.89	0.65	1.10	0.31	0.05	0.10	0.99	0.44	0.24	0.04

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Latty Avenue Properties	HISS[f]	SU-1 Surf	1.14	0.20	0.81	0.21	0.98	0.29	2.95	2.25	0.97	0.29	0.05	0.06	1.05	0.23	0.29	0.09
		SU-1 Subs	1.37	0.18	0.93	0.05	1.16	0.26	2.45	2.10	1.09	0.25	0.05	0.13	1.13	0.35	0.28	0.08
		SU-2 Surf	1.17	0.14	0.96	0.07	1.38	0.35	1.73		0.96	0.15	0.21	0.12	1.27	0.53	0.22	0.02
		SU-2 Subs	1.22	0.38	0.88	0.16	1.09	0.18	2.41	0.45	0.97	0.10	0.02	0.05	1.24	0.22	0.27	0.05
		SU-3 Surf	1.27	0.24	0.94	0.08	1.17	0.26	2.86	3.32	1.04	0.29	0.06	0.09	1.16	0.44	0.30	0.09
		SU-3 Subs	1.36	0.15	0.96	0.07	1.10	0.39	3.27	3.28	0.95	0.06	0.08	0.09	0.98	0.27	0.33	0.12
		SU-4 Surf	1.21	0.14	0.90	0.10	1.09	0.23	1.74	0.67	0.97	0.21	0.08	0.10	1.20	0.48	0.22	0.02
		SU-4 Subs	1.35	0.14	0.88	0.06	0.87	0.04	5.05	2.88	1.01	0.26	0.11	0.12	1.21	0.30	0.45	0.23
		SU-5 Surf	1.34	0.11	1.03	0.06	1.13	0.20	2.61	1.54	1.18	0.21	0.05	0.08	1.27	0.49	0.29	0.08
		SU-5 Subs	1.18	0.11	0.96	0.08	0.96	0.08	1.97	1.88	0.96	0.08	0.09	0.12	1.10	0.10	0.24	0.06
		SU-6 Surf	1.44	0.24	1.04	0.08	1.24	0.25	3.02	4.96	1.04	0.19	0.06	0.13	1.54	0.64	0.33	0.12
		SU-7 Surf	1.30	0.17	0.97	0.08	1.28	0.38	2.05	0.73	1.23	0.25	0.03	0.13	1.23	0.33	0.25	0.04
		SU-7 Subs	1.05	0.06	0.89	0.00	0.89	0.00	2.36	1.52	0.89	0.00	0.02	0.11	0.94	0.20	0.25	0.05
		SU-8 Surf	1.40	0.13	1.04	0.08	1.34	0.39	1.81	0.55	1.16	0.25	0.09	0.11	1.16	0.33	0.24	0.03
		SU-9 Surf	1.52	0.12	1.04	0.07	1.50	0.46	2.02	0.57	1.11	0.29	0.05	0.12	1.21	0.49	0.26	0.08
		SU-9 Subs	1.50	NA	1.01	NA	1.65	NA	1.55	NA	0.94	NA	-0.01	NA	1.41	NA	0.23	0.03
		SU-10 Surf	1.41	0.16	1.06	0.09	1.49	0.29	1.88	0.49	1.04	0.25	0.09	0.10	1.18	0.40	0.24	0.03
		SU-10 Subs	1.46	0.17	0.98	0.07	1.17	0.24	1.89	1.67	1.02	0.24	0.02	0.12	1.08	0.36	0.25	0.07
		SU-11 Surf	1.30	0.11	1.02	0.05	1.47	0.39	1.83	0.29	1.12	0.26	0.09	0.13	1.28	0.30	0.23	0.02
		SU-12 Surf	1.39	0.18	1.03	0.08	2.07	0.35	2.94	0.96	1.23	0.29	0.07	0.06	1.21	0.28	0.31	0.09
		SU-13 Surf	1.44	0.19	1.02	0.08	1.22	0.35	5.21	4.96	1.12	0.24	0.03	0.10	1.58	0.50	0.47	0.26
		SU-13 Subs	1.47	0.71	1.00	0.06	1.20	0.32	8.62	19.74	1.16	0.28	0.05	0.08	1.36	0.41	0.70	0.49
		SU-14 Surf	1.37	0.12	0.97	0.06	1.25	0.32	2.10	0.84	1.15	0.30	0.05	0.09	1.50	0.63	0.26	0.05
		SU-14 Subs	1.34	0.12	0.92	0.12	0.92	0.12	3.93	4.30	0.92	0.12	0.06	0.12	1.09	0.27	0.38	0.19
		SU-15 Surf	1.45	0.32	0.97	0.07	1.22	0.29	2.57	4.43	1.16	0.27	0.04	0.06	1.47	0.66	0.30	0.10
		SU-15 Subs	1.28	0.13	0.88	0.02	0.88	0.02	3.01	1.70	0.88	0.02	0.04	0.07	1.04	0.31	0.31	0.10
		SU-16 Surf	1.29	0.13	0.98	0.04	1.23	0.21	1.66	0.35	1.06	0.16	0.08	0.13	1.75	1.34	0.23	0.03
		SU-16 Subs	1.55	0.20	0.95	0.06	0.95	0.06	6.22	5.50	0.95	0.06	0.00	0.24	1.10	0.39	0.54	0.33
		SU-17 Surf	1.30	0.24	0.97	0.10	1.14	0.26	1.83	1.04	1.02	0.26	0.07	0.12	1.34	0.57	0.24	0.03
		SU-17 Subs	1.24	0.08	0.93	0.02	1.55	0.47	3.88	3.02	1.11	0.27	0.08	0.03	1.19	0.41	0.37	0.15
		SU-18 Surf	1.24	0.15	0.95	0.05	1.40	0.46	1.66	0.52	1.24	0.23	0.18	0.21	1.36	0.86	0.22	0.02
		SU-18 Subs	1.11	0.18	0.68	0.10	0.68	0.10	5.59	3.46	0.68	0.10	0.46	0.85	1.15	0.36	0.65	0.33
		SU-19 Surf	1.11	0.18	0.68	0.10	0.68	0.10	5.59	3.46	0.68	0.10	0.46	0.85	1.15	0.36	0.65	0.33
		SU-19 Subs	1.27	0.30	0.76	0.26	0.77	0.27	1.03	2.52	0.77	0.27	0.11	0.18	1.10	0.39	0.21	0.05
Latty Avenue Properties	VP-01(L) and Parcel 10K530087	SU-1 Surf[f]	1.21	0.20	0.66	0.34	0.94	0.57	4.38	5.13	0.77	0.31	0.07	0.11	1.19	0.37	0.40	0.18
		SU-1 Subs	1.03	0.23	0.82	0.22	1.09	0.45	4.02	6.52	0.90	0.28	0.09	0.09	1.17	0.75	0.39	0.21
		SU-2 Surf	1.06	0.08	0.85	0.06	1.38	0.19	2.32	0.98	1.05	0.19	0.09	0.07	1.05	0.32	0.40	0.09
		SU-2 Subs	1.09	NA	1.03	NA	1.85	NA	4.57	NA	1.05	NA	0.10	NA	0.52	NA	0.39	0.18
		SU-3 Surf	1.22	0.18	0.92	0.13	1.26	0.34	3.87	4.30	1.10	0.24	0.10	0.13	1.22	0.52	0.55	0.23
		SU-3 Subs	1.08	0.20	0.91	0.07	1.01	0.22	4.69	4.36	1.02	0.22	0.09	0.12	1.11	0.44	0.41	0.21
		SU-4 Surf	1.04	0.12	0.71	0.28	1.20	0.53	4.08	3.62	0.85	0.39	0.10	0.10	1.03	0.39	0.52	0.21
		SU-4 Subs	0.94	0.12	0.82	0.14	1.01	0.39	2.29	2.81	0.89	0.25	0.08	0.07	1.08	0.43	0.26	0.10
		SU-5 Surf	1.13	0.13	0.78	0.20	1.09	0.47	2.69	1.51	0.77	0.25	0.04	0.08	1.05	0.29	0.44	0.10
		SU-5 Subs	1.08	0.15	0.86	0.06	1.15	0.23	1.80	0.73	0.91	0.21	0.05	0.02	1.45	0.47	0.22	0.02
		SU-6 Surf	1.07	0.18	0.52	0.29	0.80	0.41	4.09	2.90	0.67	0.42	0.06	0.07	0.86	0.23	0.52	0.22
		SU-6 Subs	1.04	0.20	0.80	0.23	1.05	0.31	2.28	2.50	0.93	0.25	0.08	0.07	1.32	0.68	0.25	0.07
		SU-7 Surf	1.23	0.08	0.87	0.11	1.16	0.29	2.61	2.85	1.00	0.24	0.04	0.09	1.13	0.31	0.45	0.14
		SU-7 Subs	1.03	0.20	0.84	0.44	1.02	0.41	1.98	0.74	1.08	0.54	0.03	0.06	0.90	0.52	0.22	0.09
		SU-8 Surf	1.16	0.16	0.84	0.17	1.23	0.38	1.93	0.65	0.95	0.30	0.05	0.10	1.18	0.34	0.39	0.08
		SU-8 Subs	1.08	0.15	0.90	0.26	1.19	0.45	2.57	1.23	1.00	0.24	0.13	0.06	1.10	0.90	0.27	0.06
		SU-9 Surf[e]	1.31	0.25	0.61	0.28	1.15	0.52	3.04	1.71	0.74	0.35	0.03	0.13	1.14	0.68	0.47	0.19
		SU-9 Subs	1.32	0.24	0.99	0.07	1.53	0.46	2.32	0.62	1.15	0.20	0.04	0.16	1.47	0.75	0.27	0.06
		SU-10 Surf[e]	1.08	0.28	0.66	0.27	1.02	0.39	3.60	4.74	0.81	0.26	0.03	0.08	1.21	0.64	0.46	0.19
		SU-10 Subs	1.13	0.25	0.97	0.18	1.20	0.33	1.01	2.32	1.01	0.24	0.05	0.07	1.22	0.55	0.20	0.03
		SU-11 Surf[e]	1.28	0.25	0.79	0.20	1.15	0.40	2.56	1.53	0.87	0.23	0.07	0.10	1.01	0.70	0.40	0.12
		SU-11 Subs	1.35	0.26	0.96	0.09	1.45	0.45	2.13	0.92	1.11	0.20	0.02	0.15	1.11	0.70	0.25	0.05
		SU-12 Surf[e]	1.01	0.17	0.72	0.21	1.13	0.43	4.20	5.57	0.86	0.33	0.08	0.08	1.42	0.59	0.48	0.20
		SU-12 Subs	1.02	0.20	0.93	0.14	1.20	0.42	2.21	2.69	1.03	0.26	0.08	0.09	1.15	0.76	0.26	0.08
		SU-13 Surf[e]	0.88	0.17	0.55	0.23	0.87	0.29	5.77	6.02	0.76	0.26	0.10	0.11	1.16	0.52	0.47	0.27
		SU-13 Subs	1.02	0.17	0.91	0.14	0.99	0.29	1.83	3.52	0.95	0.23	0.07	0.07	1.16	0.52	0.25	0.08

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Latty Avenue Properties	VP-02(L)	SU-1 Surf [f]	1.18	0.10	0.90	0.22	1.27	0.44	3.52	2.47	1.03	0.32	0.04	0.12	1.16	0.47	0.34	0.12
		SU-1 Subs	1.53	0.41	0.89	0.03	1.44	0.41	9.29	16.74	0.87	0.20	0.07	0.12	1.35	0.48	0.75	0.53
		SU-2 Surf [f]	1.17	0.15	0.87	0.16	1.27	0.33	2.57	1.16	1.03	0.21	0.10	0.11	1.08	0.40	0.27	0.06
		SU-2 Subs	1.06	0.20	0.91	0.09	1.06	0.23	1.26	2.73	1.02	0.18	0.06	0.04	0.96	0.46	0.21	0.05
		SU-3 Surf [f]	1.29	0.19	0.99	0.13	1.32	0.40	2.06	2.03	1.12	0.26	0.03	0.10	1.17	0.80	0.25	0.05
		SU-3 Subs	1.41	0.41	1.06	0.10	1.29	0.29	1.66	0.41	0.91	0.30	0.06	0.11	1.29	0.42	0.23	0.03
		SU-4 Surf [f]	1.27	0.26	0.89	0.20	1.28	0.19	3.76	2.91	1.16	0.28	0.09	0.05	1.22	0.48	0.36	0.14
		SU-4 Subs	1.47	0.07	0.95	0.06	1.02	0.23	1.97	0.80	0.93	0.07	0.08	0.12	1.38	0.51	0.26	0.05
		SU-5 Surf [f]	0.90	0.09	1.03	0.08	1.38	0.34	4.90	3.67	1.19	0.39	0.10	0.07	1.13	0.44	0.41	0.21
		SU-5 Subs	0.98	0.15	1.00	0.15	1.32	0.33	2.15	1.56	1.08	0.24	0.09	0.09	0.84	0.96	0.23	0.04
		SU-6 Surf [f]	1.28	0.16	1.00	0.10	1.43	0.27	2.96	3.12	1.11	0.22	0.06	0.16	1.22	0.98	0.31	0.10
		SU-6 Subs	1.00	0.04	1.09	0.04	1.29	0.44	1.67	0.43	1.06	0.28	0.19	0.01	1.17	0.22	0.20	0.01
		SU-7 Surf [f]	1.15	0.17	0.90	0.23	1.22	0.40	2.78	2.00	1.10	0.32	0.01	0.10	0.90	0.61	0.28	0.08
		SU-7 Subs	1.23	0.11	0.85	0.07	1.09	0.24	1.67	0.81	0.97	0.23	0.01	0.08	1.16	1.00	0.22	0.02
		SU-7 Gravel [f]	1.04	0.12	0.18	0.07	0.14	0.10	8.52	0.27	0.26	0.10	0.09	0.10	0.72	0.17	0.65	0.47
		SU-8 Surf	1.25	0.18	0.95	0.09	1.37	0.40	3.36	2.59	1.16	0.23	0.05	0.08	1.18	0.57	0.51	0.20
		SU-8 Subs	1.19	NA	0.91	NA	1.09	NA	1.70	NA	0.69	NA	-0.05	NA	1.32	NA	0.22	0.004
		SU-9 Surf [f]	1.45	0.12	1.05	0.06	1.63	0.26	2.30	0.44	1.17	0.27	0.04	0.14	0.91	0.82	0.27	0.09
		SU-10 Surf [f]	1.17	0.08	0.91	0.13	1.22	0.36	2.67	1.62	1.12	0.32	0.03	0.06	0.99	0.27	0.28	0.06
		SU-11 Surf	1.22	0.13	0.88	0.10	1.16	0.22	5.39	3.08	1.13	0.26	0.08	0.15	1.20	0.42	0.65	0.34
		SU-11 Sub	1.23	NA	0.84	NA	1.33	NA	2.84	NA	0.94	NA	0.04	NA	1.21	NA	0.30	0.07
		SU-12 Surf	1.19	0.14	0.89	0.06	1.23	0.42	2.60	2.19	1.11	0.27	0.04	0.12	1.28	0.36	0.45	0.13
		SU-13 Surf	1.12	0.16	0.75	0.18	0.96	0.33	2.45	1.48	0.89	0.30	0.07	0.08	0.88	0.59	0.42	0.11
		SU-13 Subs	1.23	0.17	0.85	0.13	1.08	0.29	2.75	2.59	0.89	0.27	0.04	0.15	0.93	0.52	0.28	0.08
		SU-13 Gravel	1.27	NA	0.27	NA	0.35	NA	4.30	NA	0.35	NA	0.06	NA	0.64	NA	0.57	0.26
		SU-14 Surf [f]	1.21	0.14	0.81	0.20	1.01	0.35	2.23	1.95	0.97	0.30	0.06	0.15	1.14	0.80	0.25	0.09
		SU-14 Subs	1.26	0.15	0.84	0.18	1.11	0.32	2.75	2.10	0.95	0.27	0.01	0.12	1.04	0.74	0.29	0.08
		SU-14 Gravel	1.21	0.22	0.22	0.07	0.40	0.13	1.82	0.75	0.20	0.09	0.13	0.10	0.90	0.27	0.39	0.09
		SU-15 Surf	1.22	0.23	0.80	0.16	1.00	0.21	2.12	1.68	0.99	0.30	0.04	0.11	0.95	0.27	0.24	0.04
		SU-15 Subs	1.22	0.20	0.86	0.19	1.17	0.40	2.23	2.39	1.02	0.35	0.04	0.09	1.02	0.45	0.25	0.05
		SU-16 Surf	1.07	0.22	0.11	0.09	0.21	0.16	2.40	1.76	0.13	0.13	0.06	0.16	0.82	0.41	0.40	0.10
		SU-16 Subs	1.28	0.17	0.85	0.15	1.08	0.32	1.49	0.36	0.97	0.23	0.06	0.13	1.03	0.58	0.21	0.01
		SU-17 Surf	1.07	0.26	0.68	0.26	0.94	0.37	4.29	3.09	0.89	0.41	0.09	0.09	1.02	0.73	0.54	0.24
		SU-17 Subs	1.30	0.23	0.85	0.13	1.13	0.33	2.89	2.54	1.00	0.28	0.03	0.11	1.07	0.54	0.30	0.09
		SU-17 Gravel	0.86	0.14	0.12	0.03	0.16	0.09	2.79	3.62	0.14	0.10	0.03	0.07	0.56	0.18	0.38	0.12
		SU-18 Surf	1.07	0.20	0.69	0.14	0.96	0.27	4.46	3.14	0.87	0.22	0.04	0.10	0.95	0.48	0.55	0.24
		SU-18 Subs	1.25	0.23	0.94	0.14	1.24	0.34	2.83	3.52	1.04	0.23	0.04	0.11	1.19	0.54	0.30	0.10
		SU-18 Gravel	0.92	0.07	0.11	0.03	0.14	0.09	2.58	1.63	0.29	0.03	0.07	0.03	0.59	0.04	0.38	0.08
		SU-19 Surf	0.99	0.18	0.73	0.14	1.01	0.32	7.89	3.63	0.99	0.26	0.08	0.09	1.16	0.46	0.78	0.48
		SU-19 Subs	1.10	0.17	0.87	0.13	1.17	0.33	2.83	1.68	1.04	0.25	0.06	0.09	1.38	0.56	0.29	0.08
		SU-20 Surf	1.19	0.19	0.90	0.06	1.26	0.43	9.97	2.52	1.11	0.31	0.06	0.07	1.04	0.66	0.97	0.66
		SU-20 Subs	1.11	0.18	0.96	0.07	1.23	0.27	2.04	1.11	1.11	0.27	0.06	0.12	1.32	0.52	0.24	0.04
		SU-21 Surf	1.13	0.20	0.79	0.18	1.05	0.31	2.32	2.60	0.86	0.25	0.05	0.06	0.91	0.23	0.41	0.11
		SU-21 Subs	1.27	0.20	0.93	0.11	1.27	0.32	1.60	0.48	1.03	0.30	0.06	0.12	1.21	0.53	0.22	0.02

Table C-1. Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	SU	Residual Ra-226 (pCi/g)[a]		Residual Ra-228 (pCi/g)[a]		Residual Th-228 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-235 (pCi/g)[a]		Residual U-238 (pCi/g)[a]		SOR_G[b, c]	SOR_N[c]
			Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Latty Avenue Properties	VPs 03(L), 04(L), 05(L), and 06(L)	SU-1 Surf [f]	1.72	0.18	0.90	0.10	1.95	0.59	6.45	1.17	1.04	0.14	0.08	0.04	1.65	0.62	0.58	0.35
		SU-1 Subs	1.30	NA	0.71	NA	1.53	NA	13.90	NA	1.20	NA	0.14	NA	1.98	NA	**1.05**	0.83
		SU-2 Surf	1.05	0.17	0.85	0.17	1.17	0.25	2.37	1.43	1.05	0.22	0.07	0.08	1.16	0.46	0.40	0.10
		SU-2 Subs	1.09	0.22	0.90	0.22	1.11	0.37	1.92	2.36	0.99	0.28	0.05	0.08	1.09	0.51	0.23	0.05
		SU-3 Surf	0.99	0.12	0.86	0.13	1.15	0.26	2.67	1.71	0.96	0.24	0.07	0.06	1.07	0.51	0.40	0.10
		SU-3 Subs	1.01	0.13	0.87	0.20	1.21	0.51	1.86	1.18	1.02	0.33	0.06	0.08	1.03	0.61	0.21	0.03
		SU-4 Surf	1.24	0.20	0.85	0.25	1.03	0.32	2.97	1.85	0.87	0.19	0.06	0.15	1.29	0.43	0.49	0.17
		SU-4 Subs	1.23	0.14	0.83	0.25	1.17	0.43	3.15	1.99	0.89	0.33	0.05	0.10	1.14	0.39	0.32	0.10
		SU-5 Surf	1.38	0.27	0.91	0.15	1.18	0.32	3.87	5.25	1.09	0.25	0.10	0.16	0.24	0.34	0.56	0.26
		SU-5 Subs	1.30	0.26	0.90	0.17	1.16	0.35	2.10	0.82	1.03	0.28	0.07	0.14	1.13	0.45	0.25	0.04
		SU-6 Surf	1.56	0.23	0.90	0.17	1.16	0.29	2.67	1.13	1.02	0.27	0.04	0.12	1.04	0.35	0.52	0.21
		SU-6 Subs	1.55	0.17	0.97	0.05	1.29	0.29	2.52	1.65	1.16	0.26	0.05	0.08	1.16	0.38	0.29	0.08
		SU-7 Surf	1.29	0.08	0.83	0.08	1.17	0.28	1.78	0.52	1.01	0.28	0.07	0.11	1.06	0.60	0.41	0.10
		SU-7 Subs	1.36	0.11	0.90	0.13	1.21	0.33	2.13	0.84	1.07	0.24	0.06	0.11	1.24	0.53	0.26	0.05
Latty Avenue Properties	VP-40A (partial)	SU-1 Surf	1.32	0.20	0.94	0.23	1.24	0.29	2.78	1.06	1.12	0.19	0.10	0.13	1.13	0.35	0.49	0.17
		SU-1 Subs	1.42	0.15	1.03	0.10	1.27	0.37	1.91	0.50	0.97	0.36	0.07	0.10	1.22	0.46	0.25	0.04
		SU-2 Surf	1.26	0.29	0.74	0.24	1.04	0.43	2.07	0.85	0.84	0.34	0.03	0.10	1.11	0.40	0.42	0.11
		SU-2 Subs	1.28	0.26	0.89	0.20	1.27	0.44	2.23	2.10	1.03	0.33	0.06	0.11	1.05	0.28	0.26	0.05
Latty Avenue Properties	Futura Property	SU-1 Surf [f]	1.39	0.28	0.94	0.10	1.36	0.31	4.18	2.93	1.14	0.23	0.13	0.20	2.41	3.19	0.42	0.20
		SU-1 Subs	1.48	0.47	0.96	0.08	1.11	0.37	2.36	2.82	1.74	0.68	0.07	0.13	6.89	3.47	0.30	0.17
		SU-2 Surf [f]	1.32	0.20	0.98	0.08	1.33	0.31	3.19	3.16	1.24	0.26	0.05	0.07	1.42	0.56	0.33	0.11
		SU-2 Subs	1.32	0.41	0.93	0.03	1.28	0.26	2.87	1.87	1.49	0.66	0.03	0.11	6.16	3.57	0.28	0.14
		SU-3 Surf [f]	1.40	0.11	1.10	0.07	1.42	0.30	3.60	4.30	1.23	0.20	0.09	0.12	1.74	0.45	0.37	0.16
		SU-3 Subs	1.33	0.27	0.96	0.11	0.96	0.11	1.29	3.12	1.00	0.19	0.05	0.12	2.01	2.62	0.25	0.09
		SU-4 Surf [f]	1.36	0.15	1.04	0.08	1.31	0.34	2.04	0.80	1.10	0.16	0.09	0.06	1.45	0.69	0.26	0.04
		SU-4 Subs	1.77	0.84	NA	NA	NA	NA	4.20	NA	2.06	0.82	NA	NA	9.47	5.97	0.33	0.22
		SU-5 Surf [e]	1.22	0.32	0.90	0.19	1.16	0.28	4.61	4.87	0.98	0.21	0.12	0.09	1.11	0.38	0.44	0.21
		SU-5 Subs	1.26	0.29	0.94	0.09	1.36	0.35	3.16	3.14	1.65	0.75	0.02	0.09	4.06	3.83	0.30	0.13
		SU-6 Surf [f]	1.45	0.31	1.06	0.19	1.36	0.39	2.83	2.09	1.13	0.29	0.10	0.14	1.82	2.00	0.32	0.11
		SU-6 Subs	1.36	0.41	0.94	0.18	1.13	0.39	5.66	8.43	1.57	0.67	0.10	0.14	5.03	3.24	0.40	0.24
		SU-7 Surf [f]	1.31	0.18	0.95	0.08	1.26	0.26	2.19	1.24	1.11	0.35	0.10	0.15	1.78	1.68	0.27	0.06
		SU-7 Subs	1.76	0.38	1.08	0.06	1.34	0.30	5.54	5.02	1.73	0.56	0.32	0.27	7.83	3.26	0.39	0.25
		SU-8 Surf [f]	1.24	0.12	0.95	0.10	1.28	0.34	2.54	2.01	1.20	0.21	0.05	0.10	1.15	0.53	0.27	0.06
		SU-8 Subs	1.37	0.33	0.94	0.10	1.26	0.24	4.78	8.23	1.42	0.56	0.09	0.13	3.99	3.38	0.38	0.20
		SU-9 Surf [f]	1.46	0.25	1.06	0.08	1.19	0.27	2.77	2.46	1.14	0.26	0.04	0.10	1.48	0.58	0.31	0.10
		SU-9 Subs	1.57	1.28	0.94	0.10	1.15	0.29	2.10	2.35	1.44	0.73	0.05	0.11	4.07	3.94	0.30	0.13
		Building 1 [g]	26.11	100.88	1.40	0.64	1.43	0.63	909.63	2,295.59	1.67	0.78	1.72	1.73	14.29	15.64	43.51	43.34
		Building 2/3 [g]	72.73	263.13	1.24	0.88	1.25	0.88	998.36	3,186.73	2.01	2.61	2.24	6.38	72.56	276.55	60.95	60.75
		Building 4 [g]	4.01	9.36	0.93	0.30	0.95	0.33	89.85	203.50	1.40	0.65	0.14	0.23	6.88	10.40	4.94	4.76
		Rail Spur [g]	76.19	87.97	2.65	0.35	2.65	0.35	2,724.59	3,094.64	2.34	0.69	6.80	3.60	54.58	54.22	187.40	187.16
		Utility Poles [g]	3.37	1.94	0.84	0.40	0.87	0.42	144.44	136.54	0.84	0.40	0.24	0.20	3.61	3.39	9.93	9.70

[a] All values are gross results (include background). Radionuclide-specific means and standard deviations for each SU were estimated using only MARSSIM data (i.e., data for systematic and random samples). Biased samples are not included in the calculations of means and standard deviations presented.

[b] SOR_G represents SOR including background; SOR_N represents SOR after background is subtracted. Both the SOR_G and SOR_N values presented in this table represent the mean values calculated using only MARSSIM-based data (i.e., for systematic and random sample data). Mean SOR_G and SOR_N results do not include data for biased samples. The SOR_G value for background is based on mean background concentrations. Because the SOR_N value is based on background subtraction, the SOR_N for background is not applicable (NA).

[c] The sum of ratios is based on subsurface RGs (15/15/50) for all survey units except those for which SOR values are shaded. The shaded SOR values are based on surface RGs (5/5/50).

[d] For SU-18 and SU-19 at Hazelwood Avenue, the ROW Adjacent to Hazelwood Avenue, and SLAPS VPs 32, 35, 35A, 36, 39, 40, 42, and 47, subsurface soil criteria were applied to the SOR calculations for surface soil (i.e., as surface soil from the open excavation), subsurface soil, and the gravel layer of the cover. Surface soil criteria were applied to the SOR calculations for the asphalt/concrete layer of the cover.

[e] For surface soil data evaluations, subsurface soil criteria were applied to the SOR calculations for excavation surface sample results; however, surface soil criteria were used in the SOR calculations for the remaining soil sample results.

[f] For surface soil data evaluations, subsurface soil criteria were applied to the SOR calculations for all of the soil sample results, because they represent excavation surface data.

[g] Mean and standard deviations are for inaccessible soil data.

Note:
NA - Calculation of standard deviation is not applicable, because of only one sample in the MARSSIM dataset.

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Table C-2. Non-Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	COC	EPC[a] (mg/kg)	RG[b] (mg/kg)
SLAPS VPs	IA-13: Surface Soil	Antimony	0.42	*15*
		Arsenic	NA	*36*
		Barium	153	*2,800*
		Cadmium	0.075	*12*
		Chromium	14	*350*
		Molybdenum	1.4	*1,000*
		Nickel	19	*1,500*
		Selenium	0.99	*300*
		Thallium	0.5	*25*
		Uranium	11	*150*
		Vanadium	26	*112*
	IA-13: Subsurface Soil	Antimony	4.5	*25*
		Arsenic	NA	*40*
		Thallium	1.4	*30*
		Uranium	12	*150*
SLAPS VPs	IA-11: Surface Soil	Antimony	0.74	*15*
		Arsenic	6.7	*36*
		Barium	142	*2,800*
		Cadmium	0.28	*12*
		Chromium	12	*350*
		Molybdenum	1.4	*1,000*
		Nickel	14	*1,500*
		Selenium	0.92	*300*
		Thallium	1.7	*25*
		Uranium	6.0	*150*
		Vanadium	21	*112*
	IA-11: Subsurface Soil	Antimony	0.7	*25*
		Arsenic	9.1	*40*
		Thallium	1.7	*30*
		Uranium	5.5	*150*
Latty Avenue Properties	HISS: Surface Soil	Antimony	NA	*15*
		Arsenic	NA	*36*
		Barium	NA	*2,800*
		Cadmium	NA	*12*
		Chromium	NA	*350*
		Molybdenum	NA	*1,000*
		Nickel	NA	*1,500*
		Selenium	NA	*300*
		Thallium	NA	*25*
		Uranium	NA	*150*
		Vanadium	NA	*112*
	HISS: Subsurface Soil	Antimony	9.1	*25*
		Arsenic	15	*40*
		Thallium	2.8	*30*
		Uranium	NA	*150*
	VP-01(L) and Parcel 10K530087: Surface Soil	Antimony	2.1	*15*
		Arsenic	24.79	*36*
		Barium	163.5	*2,800*
		Cadmium	0.51	*12*
		Chromium	NA	*350*
		Molybdenum	2.78	*1,000*
		Nickel	17.93	*1,500*
		Selenium	0.92	*300*
		Thallium	4.69	*25*
		Uranium	NA	*150*
		Vanadium	22.46	*112*

Table C-2. Non-Radiological Soil Data Summary for the North St. Louis County Sites

Site	Property/Area	COC	EPC[a] (mg/kg)	RG[b] (mg/kg)
Latty Avenue Properties	VP-01(L) and Parcel 10K530087: Subsurface Soil	Antimony	1.55	*25*
		Arsenic	12.04	*40*
		Thallium	2.46	*30*
		Uranium	NA	*150*
	VP-02(L) Surface Soil	Antimony	**47.3**	*15*
		Arsenic	8.4	*36*
		Barium	160.6	*2,800*
		Cadmium	2.4	*12*
		Chromium	NA	*350*
		Molybdenum	4	*1,000*
		Nickel	16.5	*1,500*
		Selenium	2.6	*300*
		Thallium	6.5	*25*
		Uranium	NA	*150*
		Vanadium	26.4	*112*
	VP-02(L) Subsurface Soil	Antimony	**26.2**	*25*
		Arsenic	10.2	*40*
		Thallium	7.5	*30*
		Uranium	NA	*150*

[a] One half of the laboratory detection limit was used in the calculation when the result was nondetect.

[b] RG from the NC ROD (USACE 2005a).

Notes:

NA - EPC calculation was not applicable because the metal is not a COC for the respective property. No EPC was calculated for arsenic which was determined to not be a COC at IA-13.

Bold Font indicates EPC exceeds RG; however, the results of the two-tiered toxicity assessment conducted as part of the PRAR-FSSE report for VP-02(L) (USACE 2012h) indicate that all target organ HIs are less than the USEPA's acceptable value of 1.

APPENDIX D

FIVE-YEAR REVIEW SITE INSPECTIONS

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SITE INSPECTIONS

The purpose of the site inspections is to gather information about the SLS status and to visually confirm and document the impact of the response actions on the site and the surrounding areas. Because of the size of the SLS and the distance between the comprising locations, separate inspections were conducted for the SLDS and the North St. Louis County Sites (the SLAPS, the SLAPS VPs, and the Latty Avenue Properties [consisting of the HISS, Futura, and the Latty Avenue VPs]). A detailed summary of the results of the inspections is provided in this appendix.

ST. LOUIS DOWNTOWN SITE

The SLDS was inspected on November 8, 2012, by representatives of the USEPA, the MDNR, and the USACE.

The inspection focused on the following components:

- Implementation of the Remedy,
- Adequacy of O&M,
- Early Indicators of Potential Remedy Problems, and
- Opportunities for Optimization.

The following items were noted for the SLDS.

Implementation of the Remedy

The purpose of the remedy is to protect human health and environment during and upon completion of remedial activities. At the time of the site inspection, the remedy appears to be effective and functioning as designed. The following records were readily available and up-to-date:

- O&M documents,
- site-specific health and safety procedures,
- OSHA training records,
- permits,
- ground-water monitoring records,
- discharge compliance records, and
- daily access/security logs.

The general site conditions were noted as being good. Specifically, the fencing around the USACE trailers was in good condition; gates were secure; and the parking lot was in good condition. Signage and a security camera were located at the gate entrance. No trespassing or vandalism was recorded at the site.

In addition, no land use changes with the potential to compromise the remedy have occurred during the five-year review period. Roads maintained by the USACE (City Property) were found to be in good condition.

Aspects of the ground-water and surface-water remedy were also reviewed. The pumps, wellhead plumbing, and electrical enclosures were in good condition. The extraction system pipelines, valves, valve boxes, and other appurtenances (including the collection structures, pumps, and electrical enclosures) were also in good condition. Spare parts and equipment were readily available.

The water treatment system consisted of a 1-micrometer (µm) bag filter, but a settlement tank and ion exchange system was readily available if needed. The electrical enclosures and panels, tanks, vaults, and storage vessels were all observed to be in good condition.

The treatment building (Plant 7S) was in good condition.

Data collected throughout the monitoring is routinely submitted on time and is of acceptable quality.

Adequacy of Operations and Maintenance

The implementation and scope of the O&M procedures appear to be adequate to ensure the current and long-term protectiveness of the remedy. No issues that would indicate adverse impact to the current or long-term protectiveness of the remedy, or that would negatively affect human health or the environment, were noted.

Early Indicators of Potential Remedy Problems

No issues or unexpected changes in the cost or scope of O&M suggest that the protectiveness of the remedy may be compromised in the future. Additionally, during the site inspection, the USACE Project Engineer stated that no unexpected changes or issues had occurred during the previous 5 years.

Opportunities for Optimization

Two potential opportunities for optimization were noted during the SLDS site inspections.

1. The USACE was advised to continue to annually remind land owners and utility companies to contact the USACE prior to intrusive work. Reminding current landowners (existing and new) and utility companies will help reduce the possibility of intrusive activities into potential or known contaminated areas, so the remedy will remain protective of human health and the environment. An annual notice is recommended due to the potential for changes in personnel at utility companies and changes in property ownership.
2. Because the water treatment system at Plant 7S has not been used in more than 1 year, inspection of the system (tanks, pipes, etc.) for leaks may be prudent prior to start up and during initial operation.

NORTH ST. LOUIS COUNTY SITES

The North St. Louis County Sites were inspected on November 7, 2012, by representatives of the USEPA, the MDNR, and the USACE.

The inspection focused on the following components:

- Implementation of the Remedy,
- Adequacy of O&M,
- Early indicators of Potential Remedy Problems, and
- Opportunities for Optimization.

The following items were noted for the North St. Louis County Sites.

Implementation of the Remedy

The purpose of the remedy is to protect human health and environment during and upon completion of remedial activities. At the time of the site inspection, the remedy appears to be effective and functioning as designed. The following records were readily available and up-to-date:

- O&M documents,
- site-specific health and safety procedures,
- OSHA training records,
- permits,
- ground-water monitoring records,
- discharge compliance records, and
- daily access/security logs.

The general site conditions were noted as being good. Specifically, the fencing around the USACE-owned Latty and Shaw trailers at the SLAPS were in good condition; gates were secure; and the parking lots were in good condition. Signs and security cameras were posted on buildings and gates at the SLAPS. Vandalism was not evident, and the USACE was not aware of any trespassing.

In addition, no land use changes with the potential to compromise the remedy had occurred during the five-year review period. The roads maintained by the USACE (i.e., the SLAPS, IA-09 Ballfields) were in good condition.

Aspects of the ground-water and surface-water remedy were also reviewed. The pumps, wellhead plumbing, and electrical enclosures were in good condition. The extraction system pipelines, valves, valve boxes, and other appurtenances (including the collection structures, pumps, and electrical enclosures) were also in good condition. Spare parts and equipment were readily available.

The water treatment system consisted of a 1-µm bag filter with a similar backup system available. The electrical enclosures and panels, tanks, vaults, and storage vessels were all observed to be in good condition.

Data collected throughout the monitoring activities is routinely submitted on time and is of acceptable quality.

Adequacy of Operations and Maintenance

The implementation and scope of the O&M procedures appear to be adequate to ensure the current and long-term protectiveness of the remedy. No issues that would indicate adverse impact to the current or long-term protectiveness of the remedy, or that would negatively affect human health or the environment, were noted.

Early Indicators of Potential Remedy Problems

No issues or unexpected changes in the cost or scope of O&M suggest that the protectiveness of the remedy may be compromised in the future. Additionally, during the site inspection, the USACE Project Engineer stated that no unexpected changes or issues had occurred during the previous 5 years.

Opportunities for Optimization

One potential opportunity for optimization was noted at the North St. Louis County Sites.

1. The USACE was advised to continue to annually remind land owners and utility companies to contact the USACE prior to intrusive work. Reminding current landowners (existing and new) and utility companies will help reduce the possibility of intrusive activities into potential or known contaminated areas, so the remedy will remain protective of human health and the environment. An annual notice is recommended due to the potential for changes in personnel at utility companies and changes in property ownership.

APPENDIX E

COMMUNITY INTERVIEWS

(On CD-ROM on the Back Cover of this Report)

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COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

NAME Lou Aboussie

1. What is your overall impression of the project? (general sentiment)
Steadily doing the work, no problems doing it. Sharon Cotter was great. Do good meetings, responsive.

2. What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns? Have been responsive, especially Sharon, very responsive to questions of the public at oversight committee meetings, it is good they do that.

3. What are your current concerns about the site?
No.

4. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
only the ones that would be represented by oversight committee members like Sandy, Janelle, Earl Cheppell,

5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.
No

6. Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?
Feels pretty well informed, good meetings + outreach,

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No,

8. If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?
Does not recall participating

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Tim Barrett, City of Florissant Public Works

1. **What is your overall impression of the project? (general sentiment)** *The project is in process, still has a ways to go. He feels that it is transparent and making progress.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *He has worked with Jo Ann Wade, USACE, and Dan Carey, MDNR. The responsiveness has been fairly good, a pretty quick response.*

3. **What are your current concerns about the site?** *He and the City of Florissant are most concerned with Coldwater Creek and the sampling that will be done shortly.*

4. **Are you aware of any community concerns regarding the site or its operation and administration***?* **If so, please give details.** *Residents have concerns with Coldwater Creek and the unknowns. In general, there has been a positive feeling by residents of the USACE's handling of the FUSRAP project.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No, not aware of any.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *He feels fairly well informed. Communication can always be improved, but the USACE does a decent job of it. He knows of the newsletters, website, and the Oversight Committee. He did not have any suggestions for how site information should be distributed to the community.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *He began with a blanket statement – "More frequent communication with the municipalities." He wants more frequent communication than just at Oversight Committee meetings. He wants this because of the sampling along the creek. For example, he received a call from the Park Manager for Coldwater Commons Park (near St. Denis Bridge). The Park Manager saw flags or sample markings in the park and had questions. The City of Florissant also has a lot of property along the creek, and he needs more frequent communication. It would be nice to know ahead of time to be able to answer the public's questions.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He did not participate in the last 5-year-review interview process.*

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.** *This has only been done along Coldwater Creek and in parks where sampling was done to see how the areas were left after sampling. No issues have been reported.*

2. **What effects have site operations had on the surrounding community?** *Site operations have been minimal within the city limits of Florissant, even with the sampling along Coldwater Creek.*

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.** *Specific activities or incidents have been positive. He gave an example of how the MDNR helped get the USACE to sample ahead of time at some locations when needed (Florissant Community Garden and Manion Park).The outcome was positive.*

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Sandy Delcoure

1. **What is your overall impression of the project? (general sentiment)** *Seems to be going well, but it seems to be going very slowly. She understands the weather and funding holds up the cleanup.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *She really liked working with Sharon Cotner. She went on the tour with Jo Anne Wade and spoke to her about the site. She has also spoken to Gerald Allen and Branden Schneider. All have seemed responsive to her concerns.*

3. **What are your current concerns about the site?** *She is concerned that the USACE will find something along the creek that is very alarming.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *She would like better explanations of risk and dose to the community. She is also concerned about contamination at bridges and is concerned about the dust from the cleanup. The community has cancer concerns – health impacts of historical contamination and whether the ongoing cleanup has health impacts. Property values are also a concern for the area.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *Yes. For now the meetings and website coverage seems good. She suggests reporting results when complete for Coldwater Creek.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *She feels that the site's operation seems to being going slowly and wishes it could be speeded up.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *She knows a lot more now and feels more involved. She has also enjoyed working with the FUSRAP group over the years.*

The following questions were not asked by the interviewer, because they did not apply to Ms. Delcoure.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review

Name: Tiffany Drake

1. **What is your overall impression of the project? (general sentiment)** *The overall impression is that this project is proceeding well. The DNR has some current and future concerns about long-term management issues, interim institutional controls in areas to which the public may have access, and groundwater at the SLDS.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *The DNR has had extensive interactions with site representatives, including contractors, management staff, and field staff. We have found these representatives to be responsive to our concerns in general. In the few cases where we did have some problem with responsiveness, our concerns were quickly addressed in conference with project management.*

3. **What are your current concerns about the site?** *The DNR has expressed current concerns regarding interim institutional controls where the USACE may have information indicating contamination above RGs exists in publicly accessible areas. These concerns are currently being considered by the USACE. We have also expressed long-term concerns about minimizing the number of areas subject to institutional controls, making sure ICs are durable and enforceable, and the mechanics of the transition of the site to the U.S. DOE after remediation is complete. We have also expressed our concern that the USACE fully fund St. Louis FUSRAP so that community concerns about Coldwater Creek are addressed as expeditiously as possible.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *We are aware of community concerns about possible fencing and signage along Coldwater Creek to minimize public intrusion on these areas until they are fully characterized. We have heard and share the community's concerns regarding the possibility that B&K Construction Company Inc. trucks used historically to haul contaminated soil were washed out at a maintenance facility near St. Ann golf course.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *We are not aware of incidents such as those discussed. We are aware of some cases during the review period where the USACE was not notified prior to utilities or property owners excavating in contaminated soil and hope that improved procedures are reducing these incidents.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *The DNR feels well informed about the site's activities and progress. We appreciate the USACE's continued efforts to keep us informed with regular update meetings and site access. We suggest the USACE publish results of sampling of Coldwater Creek on their website as it is validated to help address community concerns.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *Our current recommendations regarding interim institutional controls, long-term management of the site, and enforceable and durable institutional controls are currently being considered by the USACE.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *She did not participate in the last review.*

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.** *The department routinely communicates with the USACE and performs site inspections and document reviews. We sometimes take splits of characterization samples or monitoring samples for independent analysis. The purpose of these activities is to verify results through state regulatory oversight of the project. We have found that our comments and concerns are addressed by project management in final documents and site actions.*

2. **What effects have site operations had on the surrounding community?** *Historical contamination has greatly concerned the surrounding community, but the department is satisfied that current site operations relating to the FUSRAP is not contributing additional contamination to the environment.*

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.** *There have been complaints to our office requiring a response, such as of stockpiled material blowing from the Ballfields area. In such cases, the USACE was contacted by the DNR and took immediate steps to mitigate the situation, as well as explain what had happened. For instance, USACE staff investigated the complaint and found that material at the Ballfields was clean fill in a stockpile and increased the frequency of wetting the material in windy conditions; the DNR communicated this information back to the complainant.*

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Harvey Ferdman

1. **What is your overall impression of the project? (general sentiment)** *He feels that it is proceeding with the appropriate caution and the right level of protection for this meticulous type of work. It has been done professionally and safely. But there needs to be a more extensive area addressed. He feels that there is potentially contamination in a larger geographic area than originally thought.*

2. **What contacts have you had with representatives of the site?** *He has been to a number of meetings and visited the USACE trailer and has spoken with Mark Peterson. Everyone has always been cooperative, professional, and transparent, which is different than the EPA.*

3. **What are your current concerns about the site?** *One of his concerns is that there are no warning signs along Coldwater Creek. There are also individual homes that may have contamination, and he's not sure how that is being addressed. He also feels that the geographic extent of the contamination is larger than known. He's also concerned with the amount of time that it's taking to complete the work. He went on to say that if this were in Ladue, the work may have been completed faster. He is unsure if the citizens in North County know what is going on, and that people are being exposed that don't know.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *At first he said he had no answer and wanted to refer this to others that were directly involved, but then he wanted to discuss the haul road testing and cleanup. He had a conversation with Matt Jefferson, EPA, about a number of citizens that were concerned that St. Charles Rock Road was used as a haul route and that historically there was a bridge from it into St. Charles County. He has heard that this may have been used to haul contaminated soil to Weldon Spring. He is concerned that there has not been any testing of the former bridge location, especially the far side. He feels that this would show if anything was hauled in that direction or not. He did say that Matt Jefferson was looking into this.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *Yes. He feels well informed. He suggested the use of clergy to distribute information to the community. He feels that this would be a good way to communicate, and the clergy could provide access to groups of citizens for educational meetings and community outreach. They could also help facilitate health surveys and access to areas for testing. This could touch off a snowball effect and touch many people in a short amount of time.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *He is happy with the management, and all interactions have been good. He also added that he could not say the same for Westlake.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He did not participate in the last 5-year review. He did want to mention an observation that bothered him. He attended a driving tour with Jenell Wright. She stopped at an intersection and pointed out the houses where people lived that had cancer. He went on to say that Jenell knows where dense cancer clusters are and also people that lived there before that had cancer. A lot of these areas are not by the creek, and he feels they may have been contaminated by wind depositing particles in these areas. He wondered if there was another transport mechanism that had not been studied yet. He gave an example of wind forming eddies that might have deposited pockets of contamination. He mentioned one area in particular that was immediately downwind of Latty Avenue and not near the creek. He wondered if more study was needed and would like to see random testing in areas of high cancer incidence. He said that he realizes that St. Louis has a high industrial base, but when you have a high incidence of cancer, maybe you should do some random testing in this area to find out what's going on and recognize patterns, He feels no one is looking at this.*

The following questions were not asked by the interviewer, because they did not apply to Mr. Ferdman.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Dan Fuehne, Ameren

1. **What is your overall impression of the project? (general sentiment)** *He really did not have an impression of the project. He said that if it needed to be done, then it needed to be done.*

2. **What contacts have you had with representatives of the site?** *He had one contact, but could not recall the person's name. The person he dealt with handled everything, and everything went fine.*

3. **What are your current concerns about the site?** *He does not have any current concerns about the site.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *No.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *Yes. He felt well informed as far as what was required for his work.*
   No. He did not have any suggestions for how information concerning the site should be distributed to the community.

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *No.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He did not recall participating in the interview process for the last 5-year review. However, if he did participate, his view has not changed.*

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.** *When Ameren did work in preparation for USACE work, they did not go back and recheck anything after the USACE finished, because there was not anything to recheck with respect to Ameren.*

2. **What effects have site operations had on the surrounding community?** *He was not aware of any.*

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. *He did not know of any.*

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: John Gunther, Gunther Salt

1. **What is your overall impression of the project? (general sentiment)** *His experience has been that the USACE and their consultants/contractors were easy to work with. They have always been very accommodating, working with his business so they would not be disruptive of workflow.*

2. **What contacts have you had with representatives of the site?** *The contractors for the USACE have changed but are still very responsive and have been in contact with plant people as well as himself.*

3. **What are your current concerns about the site?** *He has no concerns at this time, because there is no contamination on their property.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. He is not aware of any community concerns.** *He has no complaints and has not heard of any.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No. He is not aware of any of incidents on Gunther Property. He did mention that 18 months to a year ago, they had a couple of trucks broken into but have not seen much of that.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *Yes. He feels well informed. He has a lot of documentation of the work that has been done and receives a newsletter. He thought the newsletter is good, as well as the website, but was not aware of that. His only suggestion would be regular email updates to the stakeholders. He most likely was referring to business owners and utility companies affected by the site.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *He had no comments. His experience has been as good as could be expected.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He does not recall being interviewed during the last 5-year review. But he does not recall ever being unhappy with how things were being done. So if he was interviewed then, his opinion has not changed.*

   He went on to say that the USACE and their contractors have always given plenty of lead time to minimize work disruption.

The following questions were not asked by the interviewer, because they did not apply to Mr. Gunther.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Dean Jarboe

1. **What is your overall impression of the project? (general sentiment)** *Twenty years too late. Whoever (Federal Government, etc.) makes the final decisions as taken too long.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *He said that they were the only company doing multi-billion-dollar business, and they (Futura) were selected last to be cleaned up. He went on to say that they were the only source of income in the area.*

3. **What are your current concerns about the site?** *No communication of closure process from the USACE.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *Not aware of any.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No. He had a small operation there, so no one would vandalize it. "I have met with the county regarding the cleanup. I have taken pictures of 50 people working out there for the USACE cleaning up and still can't get a reduction in taxes due to the contamination." He has no real issue with the USACE and feels that the USACE came in and did their job. However he feels that he was the only one who suffered.*

6. **Do you feel well-informed about the site's activities and progress?** *No answer – don't know.*

   Do you have any suggestions for how information concerning the site should be distributed to the community? *He feels that there has been enough communication already. The USACE kept them fairly well informed.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *He feels that this question is irrelevant, because most of the work has been completed. He is not up on the "creek information."*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He does not recall participating in the last 5-year-review interview process.*

Final Comments: *He expressed that his concerns were more monetary and with St. Louis County. He cooperated with everyone and feels he got the shaft and is not happy. St. Louis County is taxing his property as if it was clean. The USACE has not supplied documentation that it is, and he cannot sell it. If the property is still contaminated, then it should be taxed accordingly. Even if he received documentation that the property was clean, he does not feel it should be worth full value.*

The following questions were not asked by the interviewer, because they did not apply to Mr. Jarboe.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Rod Jarboe

1. **What is your overall impression of the project? (general sentiment)** *He and his father have dealt mostly with contractors (Shaw) who were extremely professional and top notch. They tore out asphalt, excavated, and cleaned up the properties. However, they are unhappy with the USACE and have less respect for them. They still have not received a letter documenting their property status (clean or unclean) and have not received any communication. The USACE also has not compensated them for damage to their business or replaced damaged landscaping. St. Louis County continues to tax their property at full value, and the Jarboes either need a letter stating the property is clean so they can sell or one that it is not, so they can dispute the tax amount with St. Louis County.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *He has the contacts that were made on file, but could not recall any specifics. He and his father have had many contacts with site representatives. The ones with Shaw were all positive from the top down, extremely good. However, his experience was opposite with the USACE. They are still paying taxes as if their properties were clean but have not received a letter or documentation from the USACE that says this.*

3. **What are your current concerns about the site?** *He and his father do not know the status of their properties, but have heard that there is still contamination under the buildings on one of them. One of the properties is vacant land and has been, but he has not received documentation confirming this. He and his father had to create businesses to occupy the properties, because they have been unable to sell them. He is concerned about the contamination under the buildings making the situation worse. Lack of communication from the USACE is their biggest complaint.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *They are currently being sued by numerous class action law suits even though they were just the last owners of the property. His father bought the property unaware that it was contaminated and has been caught up in lawsuits paying a lot of money in attorney fees. The community concerns have affected them adversely.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *He said that, remarkably, there has been no vandalism or trespassing since purchasing the property 30 years ago.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *No, he does not feel well informed. There has been no communication from the USACE since they finished work on their property. They attempted to contact Sharon Cotner, with the USACE, but she never responded. They have watched the communication with community over the years and feel like things were blown out of proportion in the past. This has slowed cleanup at their property, adversely affecting them. He feels that the USACE*

could address the news reports on Coldwater Creek better. Another side should be heard versus the public side, and the USACE has not countered these properly.

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *Overall, the management has been ok. The USACE is professional, and he believes they know what they are doing. They have received many maps, booklets, and schedules, and they seem ok. However, the finality of the project is unknown, and there has been no communication of the closure process.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *He did not participate in the last 5-year-review interview process.*

The following questions were not asked by the interviewer, because they did not apply to Mr. Jarboe.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Mark Nankivil

1. **What is your overall impression of the project? (general sentiment)** *His answers refer to the SLDS only, because he has no knowledge of the other properties involved in the project. His interaction has always been positive. His only "beef" is that it is a federal project and evolution has been slow. All interactions he's had with Shaw have only been positive.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *Yes, he has interacted with Shaw and Tyco/Mallinckrodt personnel, and all interactions have all been positive.*

3. **What are your current concerns about the site?** *He does not have any concerns at this time. He did say he will as soon as the water main will be capped out on Destrehan Street. He explained further that the water main will be capped at both ends, and the USACE will need to remediate around that. He has no concerns regarding other work the USACE or their contractors have done, because they have always been thorough in prepping the site, as well as providing oversight and support for his workers when necessary.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *He is not aware of any community concerns. He also feels that 99 percent of the population does not know what is occurring at this portion of the FUSRAP project. It is a heavy industrial/commercial area, and the only time it is brought to the public's attention is when there is an article in the paper or on the news.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *He is not aware of any issues with vandalism, etc. The majority of the site is within the Mallinckrodt/Tyco complex, and they have security that prevents the general public from gaining access.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *He feels he has been reasonably informed of site activities. He does not think there is a need for constant updates. He has no suggestions for how information should be distributed to the community and feels that should be left up to Mallinckrodt/Tyco and the USACE on how they want to accomplish that. He feels that this has been adequate.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *No suggestions or recommendations. All interactions have been excellent.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *Basically, nothing has changed. He does feel that the timeframe is taking too long, but it is probably due to the federal oversight of the project.*

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.** *He feels that communication has been very good. The USACE response to his request has always been well done and smooth (i.e., capping out the Destrehan main).*
   They have a very good grasp of water line locations and ownership. The only issue he has is the slow process and progress with cleanup.

2. **What effects have site operations had on the surrounding community?** *He feels that the effects that the site has had on the surrounding community have been little to none. Due to the site being primarily on the Mallinckrodt/Tyco complex, there is no through traffic.*

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.** *He is not aware of any complaints, violations, or other incidents related to the site.*

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Kathleen Logan-Smith

1. **What is your overall impression of the project? (general sentiment)** *The FUSRAP gets things done. Good impression of the USACE.*

2. **What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?** *Her contacts with the FUSRAP (USACE) and MDNR have been during meetings with the Oversight Committee. The USACE in general is very responsive. Sometimes her group asks some uncomfortable questions. The USACE may have to research, but they always come back with the answer.*

3. **What are your current concerns about the site?** *Her main concerns are Coldwater Creek and getting it cleaned up. She went on to say she is referring not to just the obvious contamination, but where contamination/dirt was moved around by man or where Coldwater Creek has changed its course and there is contamination that needs to be cleaned up. She also had a question about the Clayco Land in Kinloch/Berkley and whether it was or was in the vicinity of a former haul road. She was concerned that it might be contaminated.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *She is asking questions regarding this now. She wants to get people "plugged in," getting them the information at the Oversight Committee Meetings. She also wants to know why there are not warning signs along Coldwater Creek to warn people of possible contamination.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *No, she is not aware of any, because she does not live in the area.*

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *She does not feel well informed right now. She appreciates the updates on the website and newsletters. She has given thought to ways to improve informing the community. She and the Oversight Committee would like to better inform specific groups, property owners along the creek, economic development people, emergency responders, etc.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *She does not have any at this time.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *She was glad to see that things she wanted 5 years ago were put into action (i.e., Road Crews, utility workers were supported by the USACE before and during their work). Now she would like to see paperwork documenting what testing and cleanup was done before the incidences of utility and road work were completed. She said that better documentation for this is needed.*

The following questions were not asked by the interviewer, because they did not apply to Ms. Logan-Smith.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

Name: Jenell Wright

1. **What is your overall impression of the project? (general sentiment)** *She feels that the project is vital and necessary and overall doing a great job. However, there is a need for an increase in funding and resources in order to expedite the sampling remediation that is left, where the residents actually are. She is relieved that the USACE has decided to do the additional sampling. Now more staff is needed to expedite the work and alleviate the risk to human life. She also mentioned that a letter was sent by the MDNR/DHSS to Washington, DC, requesting more testing and was curious if a response was ever received. She wanted to see a response to this letter.*

2. **What contacts have you had with representatives of the site?** *She has dealt with Sharon Cotner and said that Sharon was always quick, thorough, and answered all her questions. She felt that Sharon was very responsive and wonderful. But when Sharon retired, there was a gap of time where she didn't know who to call. Now she's on the Oversight Committee and the FUSRAP has directed her to JoAnn Wade, and she has been wonderful. She is also very happy with Jonathon Rankins, who is also very good. She was somewhat irritated that when she sends emails to the USACE now, the USACE forwards the email to someone first and then includes a lot of others in the CC list when they answer. Also, the USACE does not want to meet with her and the Oversight Committee unless they have an attorney present, and she finds that irritating as well. She said she and Oversight Committee want to build a bridge, not to cause issues. She feels that the situation has changed and things are different. But they still work together fine, and her only issue is the attorney presence. She also wants to see signage along Coldwater Creek, especially near parks. The MSD uses similar signage, and she wants something like this. She wants this done to protect the public.*

3. **What are your current concerns about the site?** *She wants signs along Coldwater Creek and adjacent parks until those areas are tested and deemed clean. She went on to say that she loves the USACE St. Louis Office, but more funding is needed to hire more people and labs to get the work completed faster.*

4. **Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.** *She does not know of any concerns locally, but maybe on a national level. Her main concerns are: the need for signage along Coldwater Creek and adjacent parks, the need for more resources for the USACE, and the cleanup standards that are currently used. She talked about the "safe levels" Jonathon Rankins refers to that are from the EPA and are estimated. She is concerned that the standards used may not be protective enough (especially for children and young adults to age 30-40) and that these standards should be challenged. She feels that this area is the first contaminated by this type of radioactive waste (thorium 230 and other radionuclides) and the standards should be based on actual information from this community.*

5. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.** *She does not have any knowledge of any incidents. She said that it seems that the FUSRAP works*

a lot for the MSD, responding, testing, and cleaning up when they find something, instead of addressing areas where the people actually live. The USACE needs more resources to help with this.

6. **Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?** *She feels that the USACE is doing the best that they can to inform us. She is not sure why they cannot do a better job. She has not heard anything from the USACE recently, since the January 29th Oversight Committee Meeting. She knows that Carl Chappell is concerned about parks and if they are contaminated by radionuclides. He needs this information before installing handicap-accessible playground equipment. Several emails have been sent, and he has not received any responses. She said that a year ago, she would have rated the USACE a 10 out of 10 for responsiveness, but now she would only give them a 7 or 8 out of 10. She would like an ongoing dialog with the USACE. It has been a month since she has heard from them and she is getting concerned. She has also noticed that the MDNR's involvement is less at meetings, and that has changed from a year ago when Sharon Cotner was still with the USACE.*

7. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** *Yes. Based on all the health issues, the USACE needs to do what it takes to expedite testing and remediation.*

8. **If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?** *She did not participate in the interview process for the last 5-year review. She feels that the USACE is doing a good job but needs to remember the big picture: It is essential to expedite the sampling and remediation and add signage, especially in public areas along the creek.*

The following questions were not asked by the interviewer, because they did not apply to Ms. Wright.

State and Local Considerations (other additional questions)

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

2. **What effects have site operations had on the surrounding community?**

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

COMMUNITY INTERVIEWS for Five-Year Review
Property Owners/Neighbors

NAME Mike Zlatic

1. What is your overall impression of the project? (general sentiment)
USACE has done as good as they can do given the amount of money they have allocated.

2. What contacts have you had with representatives of the site? Do you feel they were responsive to your concerns?
No contact w/ USACE; no concerns

3. What are your current concerns about the site?
Completion of the project is his largest concern.

4. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
Historical Health concerns @ Coldwater Creek but he knows there is probably not much USACE can do regarding historical issues.

5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.
No.

6. Do you feel well-informed about the site's activities and progress? Do you have any suggestions for how information concerning the site should be distributed to the community?
Get USACE newsletter; for his purposes that is sufficient.

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

8. If you participated in the interview process for the last 5-year review, has your view of the project changed since that time? If so, in what way?
Don't recall.

APPENDIX F

RISK AND DOSE ASSESSMENT CALCULATIONS FOR RADIOLOGICAL AND METAL CONTAMINANTS OF CONCERN: ST. LOUIS DOWNTOWN SITE, LATTY AVENUE PROPERTIES, AND THE ST. LOUIS AIRPORT SITE

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ATTACHMENT F-1

EVALUATION OF 2014 CANCER SLOPE AND DOSE CONVERSION FACTOR UPDATES USING RESRAD VERSION 7.0

(On CD-ROM on the Back Cover of this Report)

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1.0 BACKGROUND

Post-remediation residual radionuclide risk and dose assessments are conducted on individual properties/areas associated with the NC ROD (USACE 2005a) and the SLDS ROD (USACE 1998a). Post-remedial risk and dose estimates summarized in the SLDS ROD were calculated using RESRAD Version 5.621, as well as FGR-11 (USEPA 1988) and FGR-12 (USEPA 1993) dose conversion factors and the 1997 HEAST (USEPA 1997c) CSFs. Post-remedial risk and dose estimates summarized in the NC ROD were calculated using RESRAD Version 5.82, as well as FGR-11 and FGR-12 DCFs and the 2001 HEAST CSFs (USEPA 2001b). For the North St. Louis County Sites and SLDS radionuclide COCs, the 2001 HEAST CSFs resulted in a slightly more conservative remedial risk than those for the 1997 HEAST CSFs. 2001 HEAST CSFs were based on the those presented in FGR-13 (USEPA 1999). The PRAR-FSSE report residual risk and dose assessments for both North St. Louis County Sites and the SLDS were conducted using the most current version of RESRAD at the time, as well as the FGR-11 and FGR-12 dose coefficients and the 2001 HEAST CSFs.

In 2014, the USEPA updated the CSFs associated with the PRG calculator. The new CSFs were calculated by ORNL using the ORNL DCAL software in the manner of FGR-12 and FGR-13 for internal intakes and for external exposure, respectively, and were based on ICRP-107. ICRP-107 contains a revised database of nuclear decay data (energies and intensities of emitted radiations, physical half-lives, and decay modes) for 1,252 naturally occurring and manmade radionuclides, and ICRP-107 supersedes the previous database, ICRP-38, which was published in 1983.

In 2014, RESRAD Version 7.0 was released. RESRAD Version 7.0 extended its DCF database and software capability to include the new DCFs and CSFs associated with the 2014 USEPA PRG calculator. RESRAD Version 7.0 allows the user to select from 14 different DCF and CSF libraries: DCFPAK 3.02 (adult, infant, age 1, age 5, age 10, and age 15); DOE STD-1126-2001 (reference person); FGR-11 (FGR-13 or 2001 HEAST CSFs); and ICRP-72 (adult, infant, age 1, age 5, age 10, and age 15). Figure F-1-1 provides an example screenshot from RESRAD 7.0 for selecting the internal dose library.

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2.0 PURPOSE

The purpose of this attachment is to compare risk and dose estimates using ROD-based 2001 HEAST CSFs and DCFs (FGR-11 and FGR-12) and the new 2014 USEPA PRG calculator CSFs and DCFs (based on ICRP-107). An evaluation of the risk and dose comparisons will be used to recommend future actions related to residual risk and dose assessments for the St. Louis FUSRAP managed by the USACE.

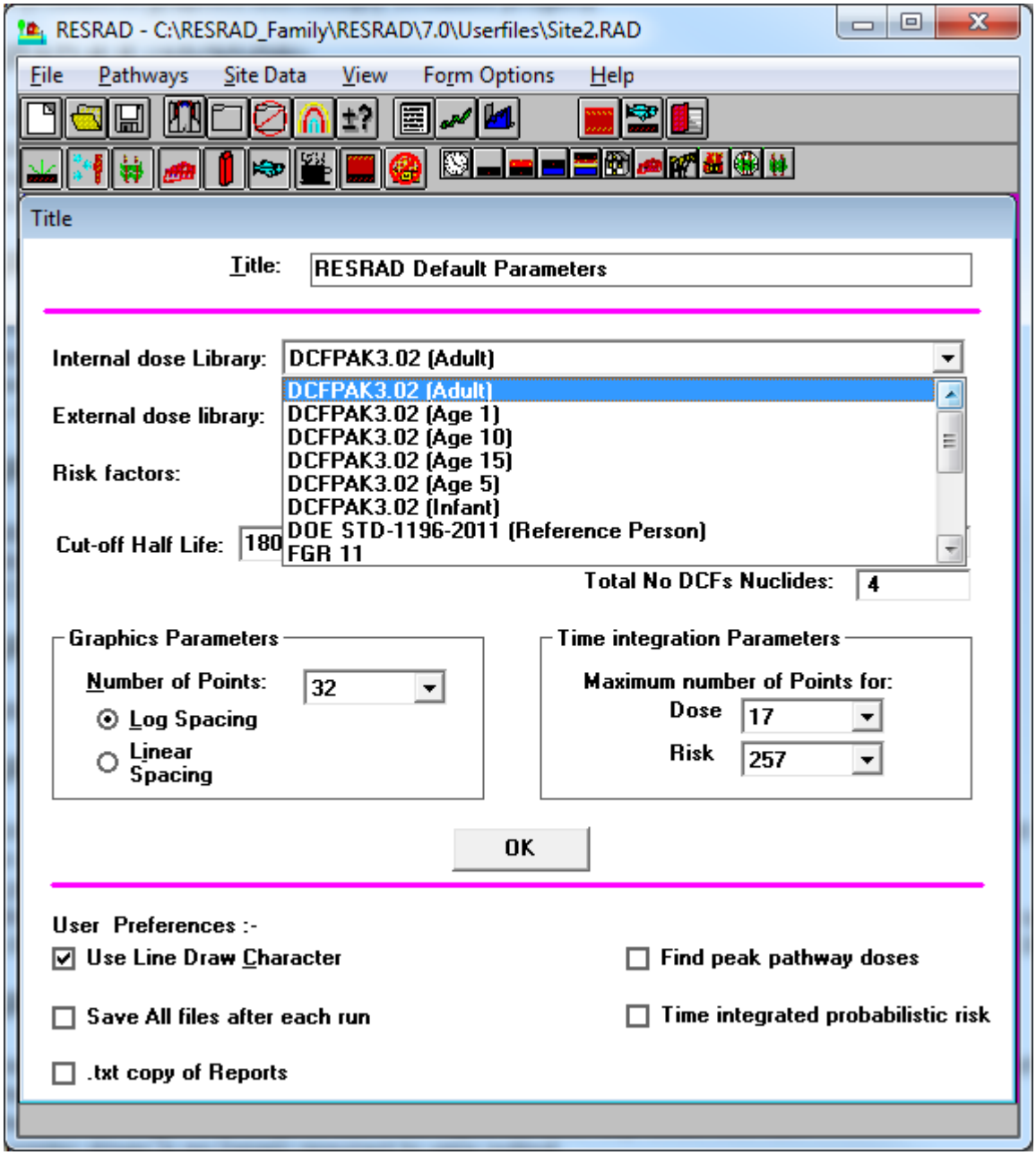

Figure F-1-1. RESRAD 7.0 Internal Dose Library Example

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3.0 SCOPE

The scope of this document is limited to residual risk and dose assessments conducted in association with the NC ROD and SLDS ROD as part of the FUSRAP managed by the USACE. The risk and dose comparisons will be based on the North St. Louis County Sites suburban resident scenario.

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4.0 CANCER SLOPE FACTORS AND DOSE CONVERSION FACTORS

In November 2014, the USEPA updated the radiological CSFs associated with the PRG calculator (http://epa-prgs.ornl.gov/radionuclides/download.html). They were slightly different from the 2001 HEAST morbidity CSFs (based on FGR-13) that have been used for St. Louis FUSRAP risk assessments. A comparison of the CSFs is provided in the Table F-1-1. A comparison of the DCF is provided in the Table F-1-2. An orange cell indicates the value increased from the current value and a green cell indicates a decrease. Cells in white remain unchanged.

Table F-1-1. Cancer Slope Factors

Isotope	CSFs Currently Used for SLS RESRAD Evaluations (2001 HEAST Slope Factors)[a]					CSFs Presented in RESRAD Version 7.0 DCFPAK 3.02 (Adult)[b]				
	Soil Ingestion (Risk/pCi)	Inhalation (Risk/pCi)[c]		External Exposure (Risk/year per pCi/g)	Food Ingestion (Risk/pCi)	Soil Ingestion (Risk/pCi)	Inhalation (Risk/pCi)[c]		External Exposure (Risk/year per pCi/g)	Food Ingestion (Risk/pCi)
Ac-227	3.81E-10	1.49E-07	S	3.48E-10	2.45E-10	2.90E-10	1.50E-07	S	1.98E-10	2.45E-10
Pa-231	3.74E-10	4.55E-08	S	1.39E-07	2.26E-10	2.26E-10	7.62E-08	F	1.27E-07	2.26E-10
Pb-210	1.84E-09	2.77E-09	M	1.41E-09	1.18E-09	1.18E-09	1.59E-08	S	1.48E-09	1.18E-09
Ra-226	7.29E-10	1.15E-08	M	2.29E-08	5.14E-10	5.14E-10	2.82E-08	S	2.50E-08	5.14E-10
Ra-228	2.28E-09	5.18E-09	M	0.00E+00	1.43E-09	1.42E-09	4.37E-08	S	3.43E-11	1.42E-09
Th-228	2.89E-10	1.32E-07	S	5.59E-09	1.48E-10	1.48E-10	1.32E-07	S	5.64E-09	1.48E-10
Th-230	2.02E-10	2.85E-08	S	8.19E-10	1.19E-10	1.19E-10	3.41E-08	F	8.45E-10	1.19E-10
Th-232	2.31E-10	4.33E-08	S	3.42E-10	1.33E-10	1.33E-10	4.33E-08	S	3.58E-10	1.33E-10
U-234	1.58E-10	1.14E-08	M	2.52E-10	9.55E-11	9.55E-11	2.78E-08	S	2.53E-10	9.55E-11
U-235	1.57E-10	1.01E-08	M	5.18E-07	9.44E-11	9.43E-11	2.50E-08	S	5.51E-07	9.43E-11
U-238	1.43E-10	9.32E-09	M	4.99E-11	8.66E-11	8.66E-11	2.36E-08	S	1.24E-10	8.66E-11

[a] As of March 2015, 2001 HEAST CSFs are currently used to calculate residual risk associated with FUSRAP PRAR-FSSE reports.

[b] RESRAD Version 7.0 DCFPAK 3.02 (adult) CSF library contains CSFs associated with the 2014 USEPA PRG calculator. Calculations of these CSFs were presented in *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014).

[c] Inhalation classifications indicate the relative amount of time it takes for the inhaled contaminant to become absorbed into the bloodstream from the lung: F (fast), M (medium), and S (slow).

Table F-1-2. Dose Conversion Factors

DCFs Currently Used for SLS RESRAD Evaluations (FGR-11 and FGR-12 DCFs)[a]					DCFs Presented in RESRAD Version 7.0 DCFPAK 3.02 (Adult)[b]				
Isotope	**Ingestion (mrem/pCi)**	**Inhalation (mrem/pCi)[c]**		**External Exposure (mrem/year per pCi/g)**	**Isotope**	**Ingestion (mrem/pCi)**	**Inhalation (mrem/pCi)[c]**		**External Exposure (mrem/year per pCi/g)**
Ac-227	1.41E-02	6.70E+00	D	4.95E-04	Ac-227	1.19E-03	5.76E-01	F	2.62E-04
Pa-231	1.06E-02	1.28E+00	W	1.91E-01	Pa-231	1.77E-03	8.51E-01	F	1.61E-01
Pb-210	5.37E-03	1.36E-02	D	2.45E-03	Pb-210	2.58E-03	2.08E-02	S	2.09E-03
Ra-226	1.32E-03	8.58E-03	W	3.18E-02	Ra-226	1.04E-03	3.52E-02	S	3.18E-02
Ra-228	1.44E-03	4.77E-03	W	0.00E+00	Ra-228	2.58E-03	5.94E-02	S	6.58E-05
Th-228	3.96E-04	3.42E-01	Y	7.94E-03	Th-228	2.66E-04	1.47E-01	S	7.25E-03
Th-230	5.48E-04	3.26E-01	W	1.21E-03	Th-230	7.92E-04	3.76E-01	F	1.11E-03
Th-232	2.73E-03	1.64E+00	W	5.21E-04	Th-232	8.55E-04	4.07E-01	F	4.78E-04
U-234	2.83E-04	1.32E-01	Y	4.02E-04	U-234	1.83E-04	3.48E-02	S	3.46E-04
U-235	2.66E-04	1.23E-01	Y	7.21E-01	U-235	1.73E-04	3.13E-02	S	7.01E-01
U-238	2.55E-04	1.18E-01	Y	1.03E-04	U-238	1.65E-04	2.97E-02	S	1.71E-04

[a] As of March 2015, FGR-11 and FGR-12 DCFs are currently used to calculate residual risk associated with FUSRAP PRARs

[b] RESRAD Version 7.0 DCFPAK 3.02 (adult) CSF library contains DCFs associated with the 2014 USEPA PRG calculator. Calculations of these DCFs were presented in *Calculation of Slope Factors and Dose Coefficients* (ORNL 2014).

[c] Inhalation classifications indicate the relative amount of time it takes for the inhaled contaminant to become absorbed into the bloodstream from the lung. For the FGR-11/FGR-12 DCFs presented in this table, the classifications are as follows: D (days), W (weeks), and Y (years). For the DCFs in this table (ORNL 2014), the classifications are as follows: F (fast) and S (slow).

Table F-1-3 lists a ratio of change value from 2001 HEAST CSFs and the FGR-11 and FGR-12 DCFs to the 2014 USEPA PRG calculator values for both CSFs and DCF. The ratio of change is obtained by dividing the new value by the old value (e.g., PRG calculator/2001 HEAST CSFs, etc.). A result less than 1.0 indicates the newer value is less than the older value (e.g., 0.9 indicates the PRG value is only 90 percent of the 2001 HEAST value). A result greater than 1.0 indicates the newer value is greater than the older value. An orange cell indicates the value increased from the current value, and a green cell indicates a decrease. Cells in white remain unchanged.

Table F-1-3. Cancer Slope Factor and Dose Conversion Factor Change Ratios

Isotope	Change in CSFs				Change in DCFs		
	Soil Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/year per pCi/g)	Food Ingestion (Risk/pCi)	Ingestion (mrem/pCi)	Inhalation (mrem/pCi)	External Exposure (mrem/yr per pCi/g)
Ac-227	0.8	1.0	0.6	1.0	0.1	0.1	0.5
Pa-231	0.6	1.7	0.9	1.0	0.2	0.7	0.8
Pb-210	0.6	5.7	1.1	1.0	0.5	1.5	0.9
Ra-226	0.7	2.4	1.1	1.0	0.8	4.1	1.0
Ra-228	0.6	8.4	[a]	1.0	1.8	12.4	[a]
Th-228	0.5	1.0	1.0	1.0	0.7	0.4	0.9
Th-230	0.6	1.2	1.0	1.0	1.4	1.2	0.9
Th-232	0.6	1.0	1.0	1.0	0.3	0.2	0.9
U-234	0.6	2.4	1.0	1.0	0.6	0.3	0.9
U-235	0.6	2.5	1.1	1.0	0.6	0.3	1.0
U-238	0.6	2.5	2.5	1.0	0.6	0.3	1.7

[a] No change in value is listed for Ra-228 for the external exposure CSF and DCF, because these values were listed as zero in 2001 HEAST CSFs and FGR-12.

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5.0 RESRAD SOFTWARE VERSION UPDATE

RESRAD Version 5.621 was used to estimate risk and dose for the SLDS ROD using FGR-11 and FGR-12 dose conversion factors and the HEAST 1997 CSFs. RESRAD Version 5.82 was used to estimate risk and dose for the NC ROD using FGR-11 and FGR-12 dose conversion factors and the 2001 HEAST CSFs. For the North St. Louis County Sites and SLDS radionuclide COCs, the 2001 HEAST CSFs resulted in a slightly more conservative remedial risk than those for the 1997 HEAST CSFs. 2001 HEAST CSFs were based on the those presented in FGR-13 (USEPA 1999). Through March 2015, PRAR-FSSE report residual risk and dose assessments for both North St. Louis County Sites and the SLDS were conducted using the most current version of RESRAD at the time, as well as the FGR-11 and FGR-12 dose coefficients and the 2001 HEAST CSFs.

Since the release of RESRAD 5.82 in 1998, 11 subsequent versions of RESRAD have been released. The RESRAD version history, including release dates and specific software modifications, can be found online at: https://web.evs.anl.gov/resrad/home2/reshstry.cfm.

In 2014, RESRAD Version 7.0 was released. RESRAD Version 7.0 extended its DCF database and software capability to include the new DCFs and CSFs associated with the 2014 USEPA PRG calculator. RESRAD Version 7.0 allows the user to select from 14 different DCF and CSF libraries: DCFPAK 3.02 (adult, infant, age 1, age 5, age 10, and age 15); DOE STD-1126-2001 (reference person); FGR-11 (FGR-13 or 2001 HEAST CSFs); and ICRP-72 (adult, infant, age 1, age 5, age 10, and age 15). An example screenshot from RESRAD 7.0 for selecting the internal dose library is shown on Figure F-1-1. DCFPAK 3.02 CSFs are based upon ICRP-107 and are the same CSF values released by the USEPA in 2014 for the PRG calculator.

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6.0 RISK AND DOSE EVALUATION

The evaluation in this report used RESRAD 7.0 to estimate risk and dose to a suburban resident receptor (i.e., the receptor associated with meeting the criteria for UUUE for North St. Louis County Sites) using the RESRAD non-default parameters and the average soil concentration distribution (assuming 1 pCi/g of Th-230) listed in Table D-2 of the NC FS (USACE 2003a). Three risk and dose estimates were obtained for which all but one RESRAD parameter remained constant and only the CSFs and DCFs were modified. The internal dose libraries selected for evaluation include: FGR-11 (FGR-11 internal DCFs, FGR-12 external DCFs, and FGR-13 morbidity CSFs); DCFPAK 3.02 (adult) (PRG calculator adult DCFs and CSFs); and DCFPAK 3.02 (infant) (PRG calculator infant DCFs and CSFs).

Note: The only parameter that changed was for soil ingestion. The soil ingestion parameter for the North St. Louis County Sites suburban resident is based on a child ingesting 200 milligrams (mg)/day for 6 years and an adult ingesting 100 mg/day for 24 years (USACE 2003a). This results in an average 30-year intake of 43.8 grams (g)/day. The 2011 Exposure Factors Handbook (USEPA 2011) recommends a soil ingestion value of 30 mg/day for infants. This equates to a RESRAD soil ingestion parameter of 10.95 g/year, which was used for the DCFPAK 3.02 (infant) evaluation in lieu of the NC FS soil ingestion parameter.

6.1 RADIOLOGICAL EXPOSURE SCENARIO

The exposure pathways applicable to the radiological risk and dose assessment for the receptor scenario are external gamma, soil ingestion, and inhalation of particulates. Because groundwater is not a potential source of drinking water for North St. Louis County Sites, the drinking water pathway was not considered as a potential pathway for the site. The CSFs for plant ingestion did not change from the 2001 HEAST CSFs to the 2014 USEPA PRG calculator; therefore, the plant ingestion pathway would result in the same risk for both sets of CSFs.

6.2 RADIOLOGICAL RECEPTOR SCENARIO

Based on the NC ROD, the suburban residential receptor is the reasonably maximally exposed receptor and is also the UUUE scenario for the North St. Louis County Sites VPs (USACE 2005a). Other scenarios listed in the NC ROD (e.g., industrial worker, utility worker, etc.) incorporate the same exposure pathways; however, those receptors spends less time on the impacted property than the suburban resident. The SLDS residential gardener receptor also includes the plant ingestion pathway; however, as shown in Tables F-1-1 and F-1-3, the CSFs for plant ingestion did not change. Therefore, the suburban residential receptor conservatively bounds risks that would be calculated for the other receptors and is appropriate to determine the effects due to changes in CSFs for all scenarios.

Unlike the soil ingestion and food ingestion CSFs used for estimating cancer risk, the ingestion DCFs apply to both the soil and food ingestion routes of exposure. The updated 2014 ingestion DCFs decreased for all radiological COCs, with the exception of Ra-228 and Th-230, which increased by factors of 1.8 and 1.4, respectively. This would indicate little or no potential for the total effective doses already estimated for the North St. Louis County Sites and SLDS properties to increase as a result of replacement of the FGR-11 and FGR-12 DCFs with the 2014 updated DCFs (based on ICRP-17). Furthermore, cancer risks estimated for the North St. Louis County Sites and SLDS properties usually determine the need for remediation, because the USEPA target risk range is exceeded before dose limits are exceeded. Therefore the suburban residential

receptor conservatively bounds doses that would be calculated for the other receptors and is appropriate to determine the effects due to changes in CSFs and DCFs for all scenarios.

The suburban residential receptor scenario is summarized as follows:

1. Suburban Residential Receptor:

   The suburban residential receptor is modeled as a potential future receptor in case the current land use for the area changes to residential. The suburban residential receptor is assumed to live on site for 350 days per year for 30 years (USACE 2003a). The suburban resident is assumed to spend 16.4 hours indoors and 2.0 hours outdoors each day (USEPA 1997b). Because child and adult ingestion rates, body weights, and exposure durations vary, exposure to the resident via ingestion of soil/sediment is based on a weighted average of the respective child and adult parameters. The assumptions used in this weighted average are:

   - The child ingests 200 mg of soil or sediment per day, over 6 years.
   - The adult ingests 100 mg of soil or sediment per day, over 24 years.
   - The infant ingests 60 mg of soil or sediment per day, over the exposure duration.

   This resident also is assumed to breathe at a rate of 0.722 yd^3 (0.552 m^3) of air per hour (USEPA 1997b). A shielding factor of 0.4 is assumed for indoor exposures. A dust loading value of 100 $\mu g/m^3$ is also assumed.

The non-default RESRAD input parameters for the suburban resident receptor scenario is presented in Table F-1-4.

Table F-1-4. RESRAD Input Parameters for Risk and Dose Assessments

Category	Parameter	Values
		Suburban Resident
Physical Parameters	Area of Contaminated Zone (m^2)	10,000
	Thickness of the Contaminated Zone (m)	0.3
Cover Parameters	Cover Depth (m)	0
	Density of the Cover Material (g/cm^3)	Not Applicable
	Cover Erosion Rate (m/yr)	Not Applicable
	Contaminated zone Erosion Rate (m/yr)	0.00006
Exposure Parameters	Inhalation Rate (m^3/yr)	4,836[a]
	Exposure Duration (year)	30
	External Gamma Shielding Factor	0.4
	Indoor Time Fraction	0.655[b]
	Outdoor Time Fraction	0.0799[c]
	Soil Ingestion (g/yr)	43.8 (adult) 21.9 (infant)

[a] Inhalation rate is based upon 0.552 m^3/hour x 8,760 hours/year = 4,836 m^3/yr.

[b] Fraction of Time Indoor per Year = (16.4 hours/day x 350 days/year) / (24 hours/day x 365 hours/day) = 0.655

[c] Fraction of Time Outdoor per Year = (2 hours/day x 350 days/year) / (24 hours/day x 365 hours/day) = 0.0799

Notes:

g/yr – gram(s) per year, m/yr – meter(s) per year, m^3/yr – cubic meter(s) per year

The suburban resident soil ingestion rate is calculated by weighting the child and adult ingestion rates and exposure durations over the entire exposure duration as follows:

Soil Ingestion Rate Adult =

$$\left(\frac{(100\frac{mg}{day} * 24\,year) + (200\frac{mg}{day} * 6\,year)}{30\,year} \right) * 365\frac{day}{year} * \frac{g}{1{,}000\,mg} = 43.8\,g/year$$

Soil Ingestion Rate Infant = $60\frac{mg}{day} * 365\frac{day}{year} * \frac{g}{1{,}000\,mg} = 21.9\,g/year$

Values used in the adult soil ingestion equation were taken from Table D-2 and Section D.1.2.2 of the NC FS (USACE 2003a). Values used in the infant soil ingestion equation were taken from Table 5-1 of the 2011 Exposure Factors Handbook (USEPA 2011).

6.3 SOIL CONCENTRATION DISTRIBUTION

Table F-1-3 presented the ratio of change from the ROD-related CSFs and DCFs (2001 HEAST CSFs and the FGR-11 and FGR-12 DCFs) to the new CSFs and DCFs presented in the RESRAD DCFPAK 3.02 (adult) dose factor library (i.e., CSFs and DCFs associated with the USEPA 2014 update to the PRG calculator). The ratio of change may have increased, decreased, or stayed the same depending on the radionuclide and specific pathway. Because the residual risk and dose assessment provides risk and dose values that are sums of individual radionuclide risk and dose, the initial soil concentrations input into RESRAD were based on the soil concentration distribution of radionuclides for North St. Louis County Sites residential VPs, as listed in Table D-2 of the NC FS (USACE 2003a). The activity fraction distributions and soil concentrations are listed in Table F-1-5.

Table F-1-5. RESRAD Input Parameters for Risk and Dose Assessments

Isotope	North St. Louis County Sites VP Activity Fractions[a]	RESRAD Soil Concentration (pCi/g)
Ac-227	0.00700	0.007
Pa-231	0.01400	0.014
Pb-210	0.00800	0.008
Ra-226	0.00700	0.007
Ra-228	0.00036	0.00036
Th-228	0.00100	0.001
Th-230	1.00000	1
Th-232	0.00100	0.001
U-234	0.01200	0.012
U-235	0.00052	0.00052
U-238	0.01200	0.012

[a] Activity fraction value listed in Table D-2 of the NC FS (USACE 2003a) for residential VPs.

6.4 RADIOLOGICAL RISK AND DOSE ASSESSMENT RESULTS AND SUMMARY

Table F-1-6 summarizes the maximum radiological risk and dose calculated for a 1,000-year period to the suburban resident receptor from exposure to the residual radionuclides present at the assessed property for the three sets of CSFs and DCFs evaluated. Table F-1-6 also provides the maximum Th-230 soil concentration associated with each risk and dose limit, 1E-4 risk and 19 mrem/yr, respectively.

Table F-1-6. Cancer Slope Factor and Dose Conversion Factor Evaluation Risk and Dose Results

	2001 HEAST CSFs and the FGR-11 and FGR-12 DCFs		DCFPAK 3.02 (Adult)		DCFPAK 3.02 (Infant)	
	Risk	**Dose[a]**	**Risk**	**Dose[a]**	**Risk**	**Dose[a]**
Maximum Risk/Dose Value	1.00E-04	19	1.00E-04	19	1.00E-04	19
RESRAD Result	2.46E-06	0.13	2.41E-06	0.13	2.26E-06	0.41
Th-230 (pCi/g) Equivalent to Maximum Risk/Dose	40.65	146.15	41.49	146.15	44.25	46.34

[a] Dose is listed in mrem/yr.

The risk results listed in Table F-1-6 show that the 2001 HEAST and FGR-13 CSFs for the FUSRAP COCs in an average soil concentration distribution applicable to North St. Louis County Sites residential VPs would result in a risk that is slightly higher than the DCFPAK 3.02 (adult) (approximately 2 percent) and DCFPAK 3.02 (infant) (approximately 8 percent) CSFs. The dose results show no difference between the FGR-11 and FGR-12 DCFs and DCFPAK 3.02 (adult) DCFs; however, the DCFPAK 3.02 (infant) DCFs resulted in a dose approximately three times higher than the doses for the other DCFs.

A comparison of the Th-230 soil concentration equivalent to maximum risk and dose listed in the NC ROD shows that, in all three cases, the risk range will be exceeded before the maximum dose is exceeded as soil concentrations increase. This means that although the DCFPAK 3.02 (infant) DCFs produced a dose three times higher than the 2001 HEAST CSFs/DCFPAK 3.02 (adult) DCFs, the risk value has a higher priority, because it will exceed the risk range before dose exceeds the dose limit.

The primary risk and dose contributor in all three cases is Th-230, and the primary risk and dose contributing pathway is external, with the exception of dose using the DCFPAK 3.02 (infant) DCFs) if the primary dose contributing pathway is soil ingestion.

RESRAD risk and dose graphs and RESRAD output files for all modeled scenarios are provided in Attachments F-1-1 and F-1-2, respectively.

6.5 EVALUATION UNCERTAINTY

The risk assessment modeling conducted for St. Louis FUSRAP PRAR-FSSE reports are conservative in nature, and minor changes in CSFs are unlikely to cause actual residual risk to exceed the CERCLA risk range. The primary risk driver pathway is from external radiation exposure; and in cases in which material has been remediated to meet RGs, clean backfill is used to fill in the excavation. As a conservative approach, St Louis FUSRAP risk assessment modeling does not account for the clean backfill (i.e., the modeling assumes the residual

contaminants are on the surface and accessible to receptors). Accounting for the backfill would significantly reduce the actual residual risk.

The USEPA defines the CERCLA target risk range as 10^{-6} to 10^{-4} where "the upper boundary of the risk range is not a discrete line at 10^{-4}. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions" (USEPA 1997a).

6.6 RECOMMENDATIONS FOR FUTURE USE OF CANCER SLOPE FACTORS AND DOSE CONVERSION FACTORS

The USACE has received comments related to FUSRAP residual risk and dose assessments from other shareholders recommending the use of the USEPA-updated 2014 CSFs associated with the PRG calculator. These same CSFs are listed in RESRAD's DCFPAK 3.02 (adult) DCF library.

Based on this evaluation, no substantial difference in risk was determined between using the 2001 HEAST and FGR-13 CSFs and the DCFPAK 3.02 (adult) CSFs (i.e., 2014 USEPA PRG CSFs based on ICRP-107) for St Louis FUSRAP receptors. Similarly, the evaluation shows no difference in dose results between the FGR-11 and FGR-12 DCFs and the DCFPAK 3.02 (adult) DCFs. Therefore, application of the updated DCFPAK 3.02 (adult) CSFs and DCFs in future St. Louis FUSRAP residual risk and dose assessments will not likely result in a property meeting the criteria for unrestricted (i.e., per the SLDS ROD) when, in fact, it does not meet the SLDS ROD criteria for unrestricted use based on calculations using the previous CSFs (i.e., from the 2001 HEAST) and DCFs (i.e., from FGR-11 and FGR-12).

Therefore, it is recommended that future residual risk and dose assessments be conducted using the DCFPAK 3.02 (adult) CSFs and DCFs and evaluations similar to the one presented in this attachment be conducted when future CSF and DCF updates occur.

Additionally, because the DCFPAK 3.02 (adult) CSFs result in a slightly smaller risk, previously completed risk assessments do not require re-evaluation.

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ATTACHMENT F-1-1

RESRAD GRAPHS

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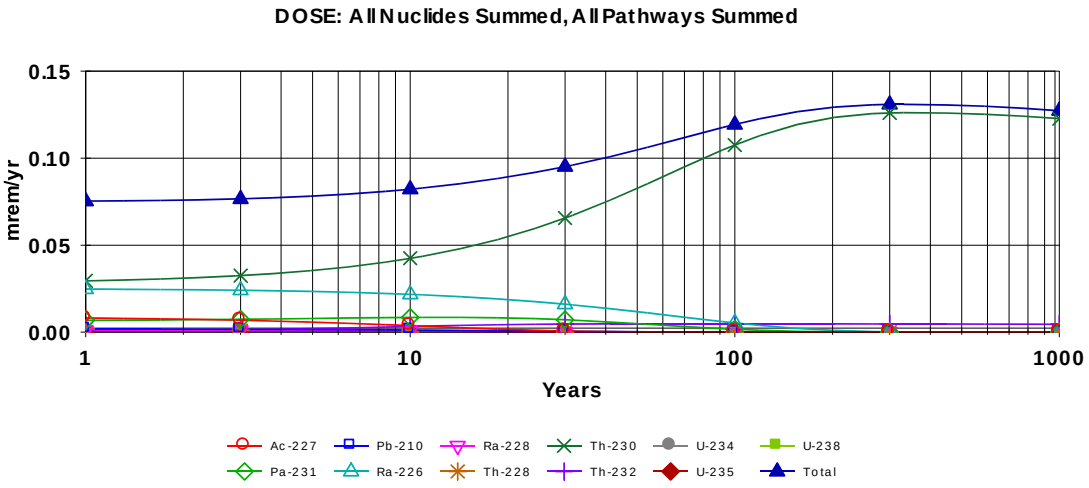
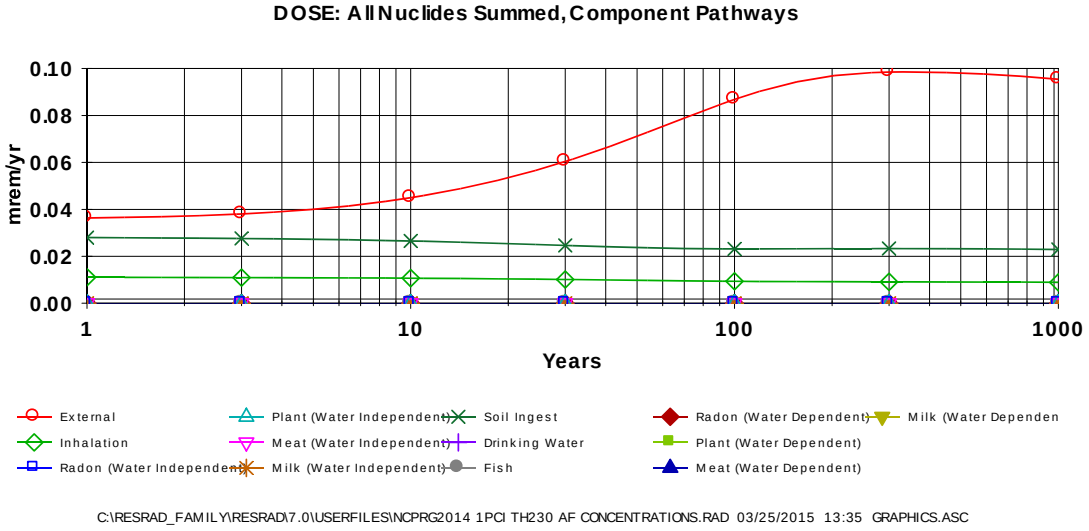
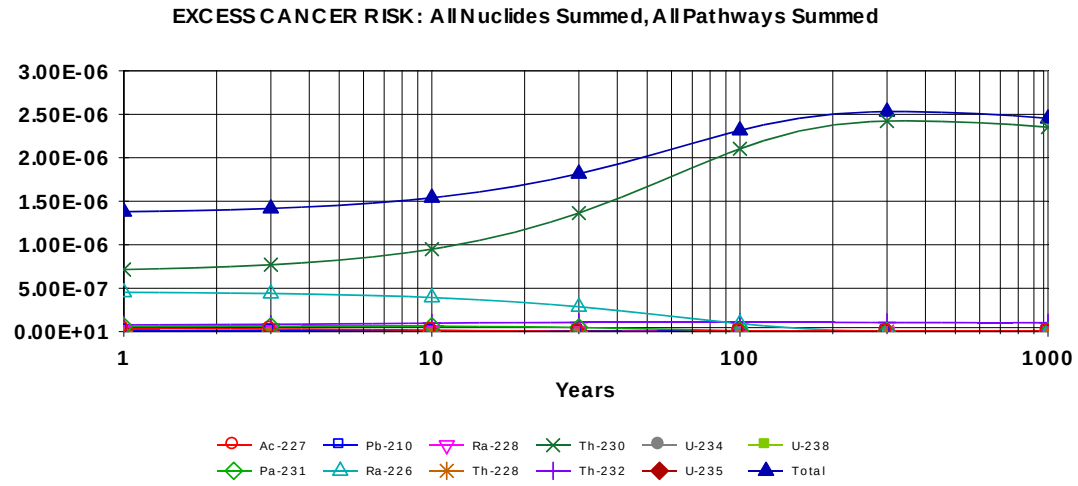
2001 HEAST/FGR-11 and FGR-12 – Dose





For the FUSRAP suburban resident scenario, the primary dose contributors for the FGR-11 and FGR-12 dose factor library are Th-230 and the external pathway.

2001 HEAST/FGR-11 and FGR-12 – Risk



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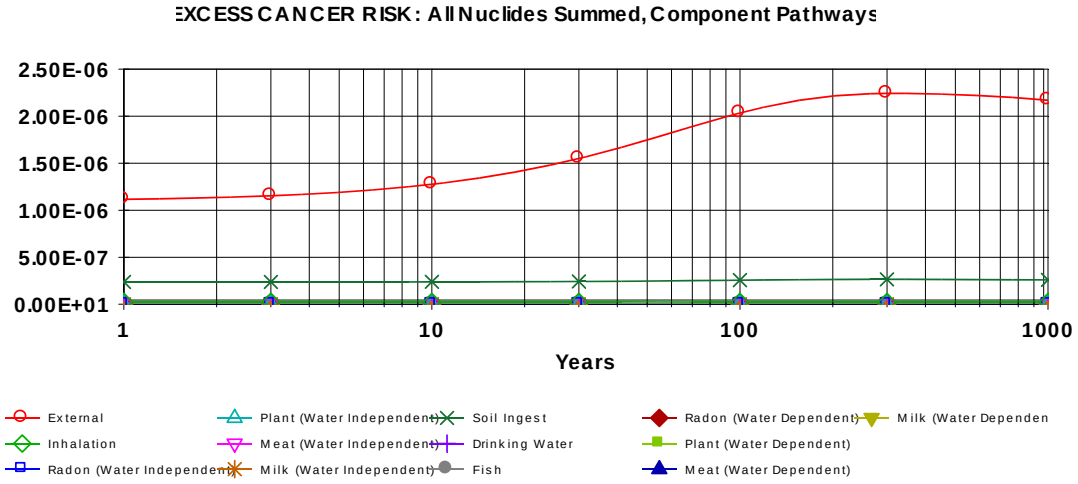

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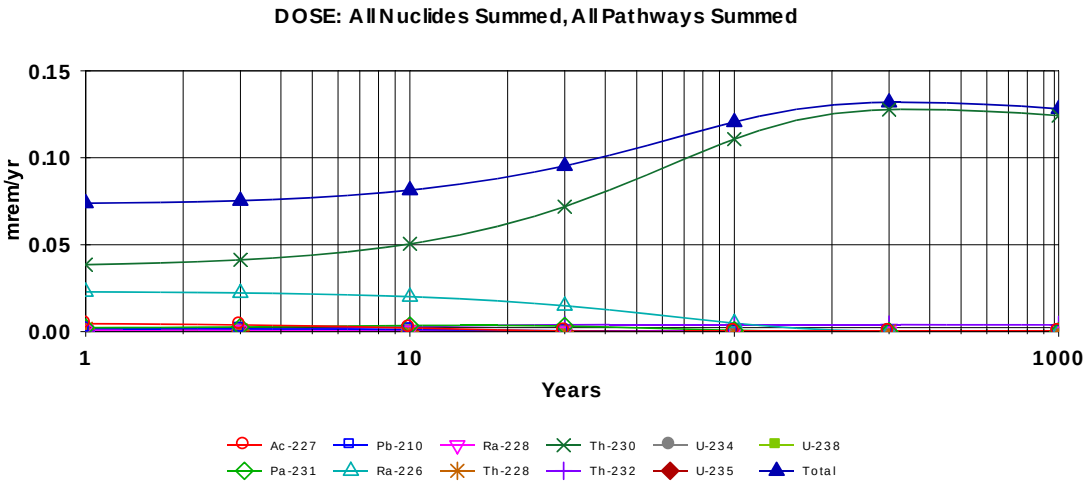
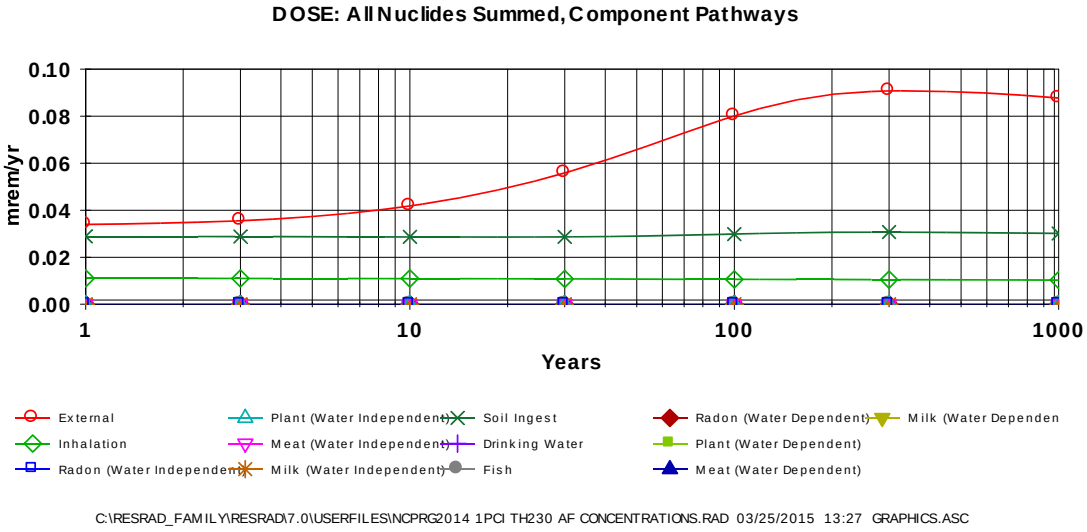
For the FUSRAP suburban resident scenario, the primary risk contributors for the 2001 HEAST CSF library are Th-230 and the external pathway.

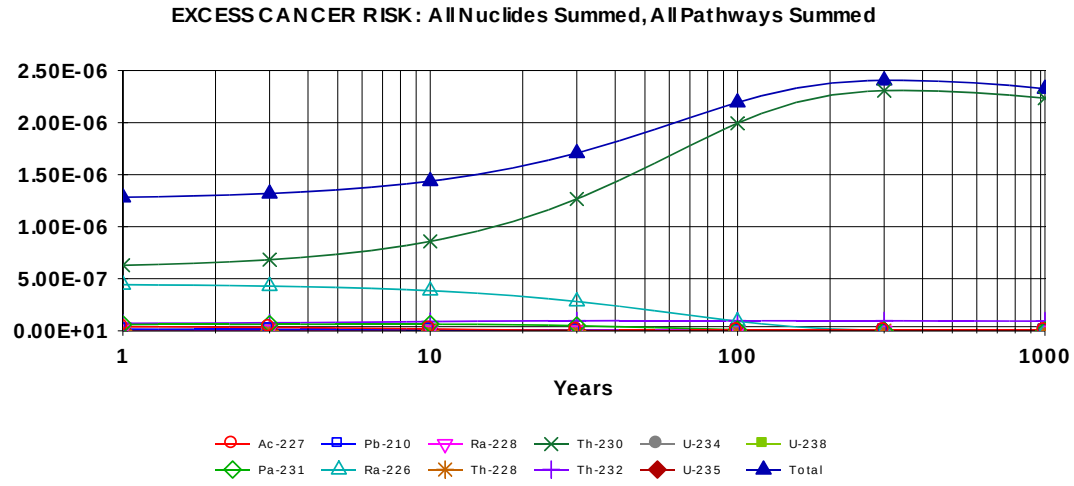
DCFPAK 3.02 (Adult) – Dose

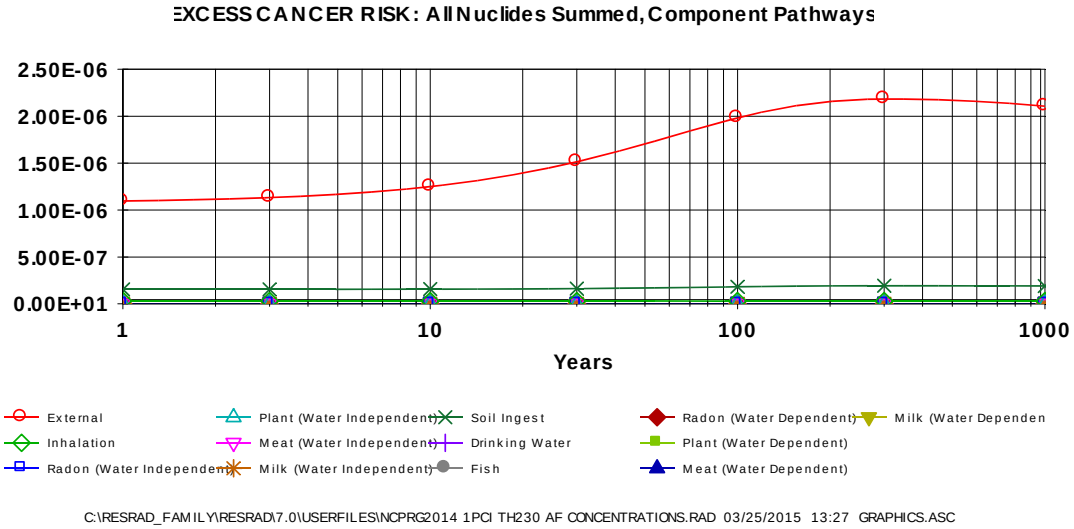




For the FUSRAP suburban resident scenario, the primary dose contributors for the DCFPAK 3.02 (adult) dose factor library are Th-230 and the external pathway.

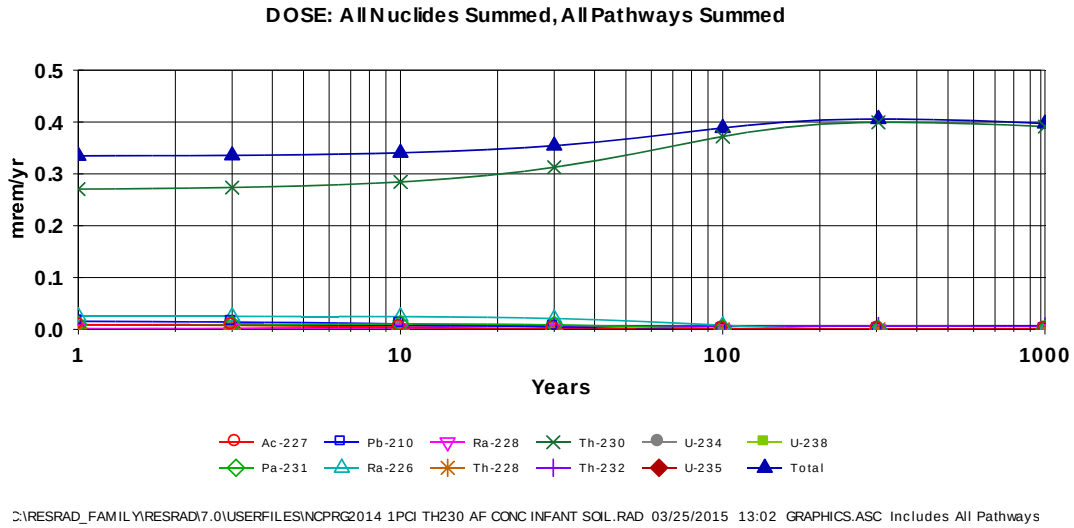
DCFPAK 3.02 (Adult) – Risk

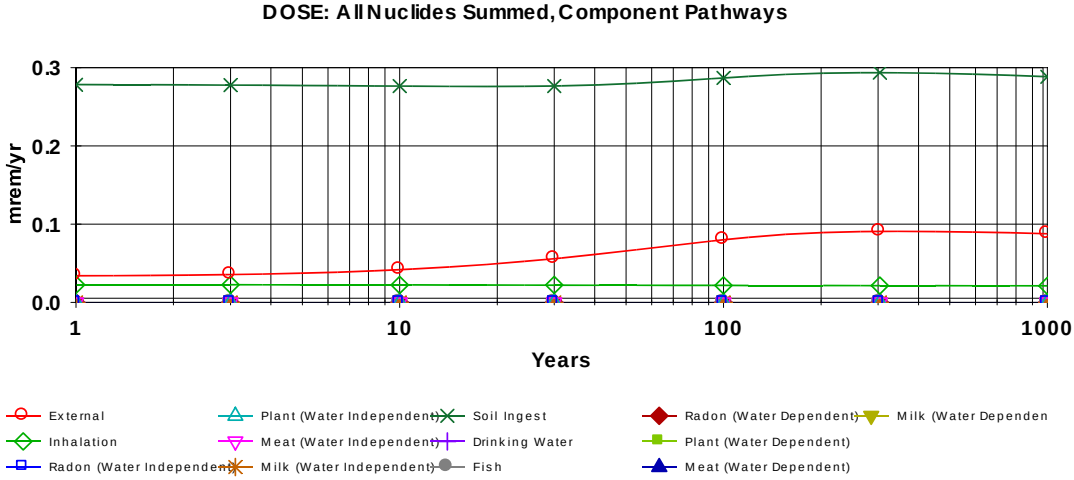




For the FUSRAP suburban resident scenario, the primary risk contributors for the DCFPAK 3.02 (adult) CSF library are Th-230 and the external pathway.

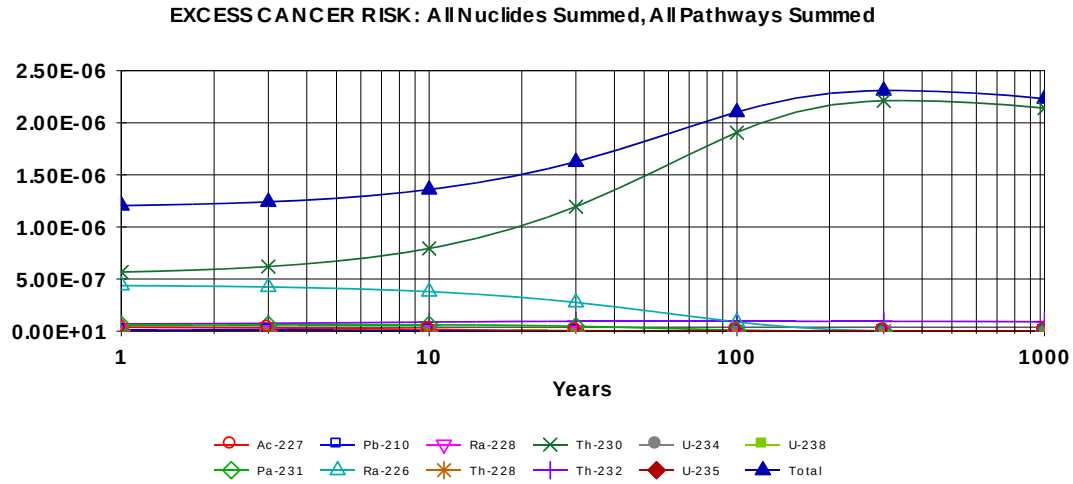
DCFPAK 3.02 (Infant) – Dose

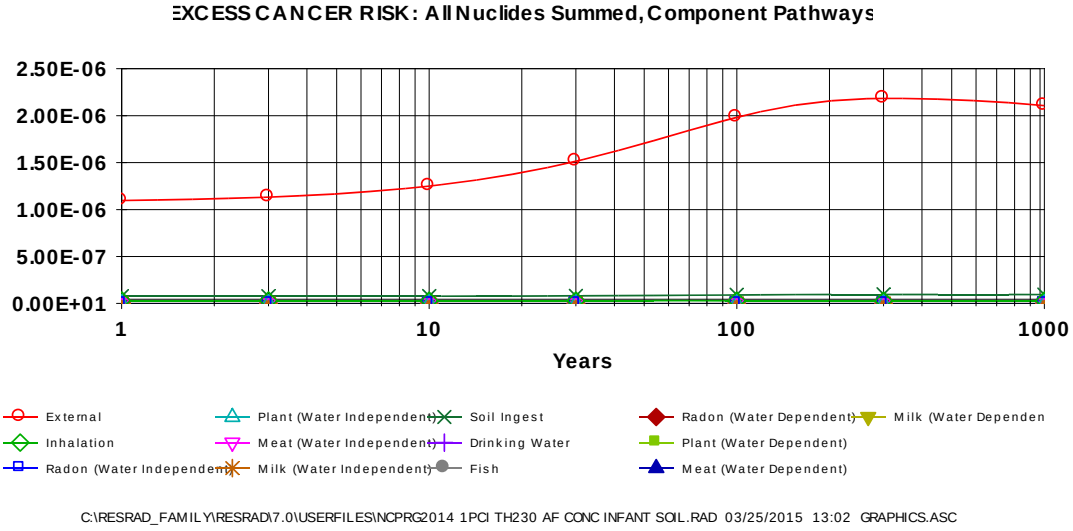




For the FUSRAP suburban resident scenario, the primary dose contributors for the DCFPAK 3.02 (infant) dose factor library are Th-230 and the soil ingestion pathway.

DCFPAK 3.02 (Infant) – Risk





For the FUSRAP suburban resident scenario, the primary risk contributors for the DCFPAK 3.02 (infant) CSF library are Th-230 and the external pathway.

ATTACHMENT F-1-2

RESRAD OUTPUT REPORTS

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2001 HEAST – Dose

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	At-219 (Source: no data)	0.000E+00	-2.000E+00	DCF1(4)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(5)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(6)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(7)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(8)
A-1	Bi-215 (Source: no data)	0.000E+00	-2.000E+00	DCF1(9)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(10)
A-1	Hg-206 (Source: no data)	0.000E+00	-2.000E+00	DCF1(11)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(12)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(13)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(14)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(15)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(16)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(17)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(18)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(19)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(20)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(21)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(22)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(23)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(24)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(25)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(26)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(27)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(28)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(29)
A-1	Rn-218 (Source: FGR 12)	4.540E-03	4.540E-03	DCF1(30)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(31)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(32)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(33)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(34)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(35)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(36)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(37)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(38)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(39)
A-1	Tl-206 (Source: FGR 12)	7.697E-03	7.697E-03	DCF1(40)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1(41)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(42)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(43)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(44)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1(45)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(46)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Ac-227+D1	6.724E+00	6.700E+00	DCF2(2)
B-1	Ac-227+D2	6.708E+00	6.700E+00	DCF2(3)
B-1	Ac-227+D3	6.708E+00	6.700E+00	DCF2(4)
B-1	Ac-227+D4	6.700E+00	6.700E+00	DCF2(5)
B-1	Ac-227+D5	6.700E+00	6.700E+00	DCF2(6)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(7)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(13)
B-1	Pb-210+D1	2.320E-02	1.360E-02	DCF2(14)
B-1	Pb-210+D2	1.380E-02	1.360E-02	DCF2(15)
B-1	Pb-210+D3	1.360E-02	1.360E-02	DCF2(16)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(17)
B-1	Ra-226+D1	8.594E-03	8.580E-03	DCF2(20)
B-1	Ra-226+D2	8.587E-03	8.580E-03	DCF2(23)
B-1	Ra-226+D3	8.587E-03	8.580E-03	DCF2(26)
B-1	Ra-226+D4	8.580E-03	8.580E-03	DCF2(29)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(32)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(33)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(34)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(49)
B-1	U-234	1.320E-01	1.320E-01	DCF2(50)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(65)
B-1	U-238	1.180E-01	1.180E-01	DCF2(71)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(72)
B-1	U-238+D1	1.180E-01	1.180E-01	DCF2(87)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Ac-227+D1	1.480E-02	1.410E-02	DCF3(2)
D-1	Ac-227+D2	1.477E-02	1.410E-02	DCF3(3)
D-1	Ac-227+D3	1.477E-02	1.410E-02	DCF3(4)
D-1	Ac-227+D4	1.411E-02	1.410E-02	DCF3(5)
D-1	Ac-227+D5	1.411E-02	1.410E-02	DCF3(6)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(7)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(13)
D-1	Pb-210+D1	7.276E-03	5.370E-03	DCF3(14)
D-1	Pb-210+D2	5.376E-03	5.370E-03	DCF3(15)
D-1	Pb-210+D3	5.370E-03	5.370E-03	DCF3(16)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(17)
D-1	Ra-226+D1	1.321E-03	1.320E-03	DCF3(20)
D-1	Ra-226+D2	1.320E-03	1.320E-03	DCF3(23)
D-1	Ra-226+D3	1.320E-03	1.320E-03	DCF3(26)
D-1	Ra-226+D4	1.320E-03	1.320E-03	DCF3(29)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(32)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(33)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(34)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(49)
D-1	U-234	2.830E-04	2.830E-04	DCF3(50)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(65)
D-1	U-238	2.550E-04	2.550E-04	DCF3(71)
D-1	U-238+D	2.709E-04	2.550E-04	DCF3(72)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-238+D1	2.687E-04	2.550E-04	DCF3(87)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Ac-227+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(2,1)
D-34	Ac-227+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,2)
D-34	Ac-227+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,3)
D-34				
D-34	Ac-227+D2 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(3,1)
D-34	Ac-227+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,2)
D-34	Ac-227+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,3)
D-34				
D-34	Ac-227+D3 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Ac-227+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,2)
D-34	Ac-227+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-34				
D-34	Ac-227+D4 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Ac-227+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,2)
D-34	Ac-227+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)
D-34				
D-34	Ac-227+D5 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	Ac-227+D5 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,2)
D-34	Ac-227+D5 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(13,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(13,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(13,3)
D-34				
D-34	Pb-210+D1 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(14,1)
D-34	Pb-210+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(14,2)
D-34	Pb-210+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(14,3)
D-34				
D-34	Pb-210+D2 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(15,1)
D-34	Pb-210+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(15,2)
D-34	Pb-210+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(15,3)
D-34				
D-34	Pb-210+D3 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(16,1)
D-34	Pb-210+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(16,2)
D-34	Pb-210+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(16,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(17,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Ra-226+D1 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(20,1)
D-34	Ra-226+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,2)
D-34	Ra-226+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,3)
D-34				
D-34	Ra-226+D2 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(23,1)
D-34	Ra-226+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,2)
D-34	Ra-226+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,3)
D-34				
D-34	Ra-226+D3 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(26,1)
D-34	Ra-226+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,2)
D-34	Ra-226+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,3)
D-34				
D-34	Ra-226+D4 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(29,1)
D-34	Ra-226+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,2)
D-34	Ra-226+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(32,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(33,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(33,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(33,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(34,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(34,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(34,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(49,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(49,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(49,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(50,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(50,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(50,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(65,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(65,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(65,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(71,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(71,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(71,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(72,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(72,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(72,3)
D-34				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
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0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	U-238+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(87,1)
D-34	U-238+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(87,2)
D-34	U-238+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(87,3)
D-34				
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Ac-227+D1 , fish	1.500E+01	1.500E+01	BIOFAC(2,1)
D-5	Ac-227+D1 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Ac-227+D2 , fish	1.500E+01	1.500E+01	BIOFAC(3,1)
D-5	Ac-227+D2 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5				
D-5	Ac-227+D3 , fish	1.500E+01	1.500E+01	BIOFAC(4,1)
D-5	Ac-227+D3 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5				
D-5	Ac-227+D4 , fish	1.500E+01	1.500E+01	BIOFAC(5,1)
D-5	Ac-227+D4 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)
D-5				
D-5	Ac-227+D5 , fish	1.500E+01	1.500E+01	BIOFAC(6,1)
D-5	Ac-227+D5 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(13,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(13,2)
D-5				
D-5	Pb-210+D1 , fish	3.000E+02	3.000E+02	BIOFAC(14,1)
D-5	Pb-210+D1 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(14,2)
D-5				
D-5	Pb-210+D2 , fish	3.000E+02	3.000E+02	BIOFAC(15,1)
D-5	Pb-210+D2 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(15,2)
D-5				
D-5	Pb-210+D3 , fish	3.000E+02	3.000E+02	BIOFAC(16,1)
D-5	Pb-210+D3 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(16,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(17,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(17,2)
D-5				
D-5	Ra-226+D1 , fish	5.000E+01	5.000E+01	BIOFAC(20,1)
D-5	Ra-226+D1 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(20,2)
D-5				
D-5	Ra-226+D2 , fish	5.000E+01	5.000E+01	BIOFAC(23,1)
D-5	Ra-226+D2 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(23,2)
D-5				
D-5	Ra-226+D3 , fish	5.000E+01	5.000E+01	BIOFAC(26,1)
D-5	Ra-226+D3 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(26,2)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
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0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D4 , fish	5.000E+01	5.000E+01	BIOFAC(29,1)
D-5	Ra-226+D4 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(29,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(32,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(32,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(33,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(33,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(34,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(34,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(49,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(49,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(50,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(50,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(65,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(65,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(71,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(71,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(72,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(72,2)
D-5				
D-5	U-238+D1 , fish	1.000E+01	1.000E+01	BIOFAC(87,1)
D-5	U-238+D1 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(87,2)
D-5				

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	7.000E-03	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.400E-02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pb-210	8.000E-03	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): Ra-226	7.000E-03	0.000E+00	---	S1(17)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.600E-04	0.000E+00	---	S1(32)
R012	Initial principal radionuclide (pCi/g): Th-228	1.000E-03	0.000E+00	---	S1(33)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(34)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E-03	0.000E+00	---	S1(49)
R012	Initial principal radionuclide (pCi/g): U-234	1.200E-02	0.000E+00	---	S1(50)
R012	Initial principal radionuclide (pCi/g): U-235	5.200E-04	0.000E+00	---	S1(65)
R012	Initial principal radionuclide (pCi/g): U-238	1.200E-02	0.000E+00	---	S1(71)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(17)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(32)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(33)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(34)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(49)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(50)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(65)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(71)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.497E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.109E-02	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(32)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(32,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(32)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(32)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(32)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(33)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(33,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(33)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(33)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(33)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(34)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(34,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(34)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(34)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(34)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(49)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(49,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(49)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(49)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(49)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(50)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(50,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(50)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(50)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(50)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(65)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(65,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(65)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(65)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(65)

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(71)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(71,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(71)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(71)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(71)
R017	Inhalation rate (m**3/yr)	4.836E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.550E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	7.990E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	4.380E+01	3.650E+01	---	SOIL

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R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5

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STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

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Contaminated Zone Dimensions

Area:	10000.00 square meters
Thickness:	0.30 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	7.000E-03
Pa-231	1.400E-02
Pb-210	8.000E-03
Ra-226	7.000E-03
Ra-228	3.600E-04
Th-228	1.000E-03
Th-230	1.000E+00
Th-232	1.000E-03
U-234	1.200E-02
U-235	5.200E-04
U-238	1.200E-02

0

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	7.494E-02	7.534E-02	7.662E-02	8.219E-02	9.515E-02	1.194E-01	1.309E-01	1.273E-01
M(t):	2.998E-03	3.014E-03	3.065E-03	3.288E-03	3.806E-03	4.775E-03	5.238E-03	5.091E-03

0Maximum TDOSE(t): 1.310E-01 mrem/yr at t = 331.2 ± 0.7 years
0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.312E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.440E-15	0.0000	4.112E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.040E-15	0.0000
Pa-231	3.491E-06	0.0000	1.159E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.193E-06	0.0000
Pb-210	1.299E-11	0.0000	4.168E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-09	0.0000
Ra-226	1.132E-04	0.0009	3.242E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E-05	0.0001
Ra-228	5.689E-23	0.0000	1.270E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.156E-25	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	9.398E-02	0.7175	9.061E-03	0.0692	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.314E-02	0.1766
Th-232	4.474E-03	0.0342	5.425E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.510E-04	0.0012
U-234	4.651E-07	0.0000	7.394E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.859E-07	0.0000
U-235	8.510E-08	0.0000	1.455E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.236E-09	0.0000
U-238	3.339E-07	0.0000	2.576E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.742E-08	0.0000
Total	9.858E-02	0.7525	9.116E-03	0.0696	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.330E-02	0.1779

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.312E+02 years

0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.892E-15	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.842E-06	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-04	0.0009
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.773E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.262E-01	0.9632
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.680E-03	0.0357
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.249E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.079E-08	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.271E-07	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.421E-03	0.0590	1.262E-03	0.0168	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.194E-03	0.0426
Pa-231	1.007E-03	0.0134	5.366E-04	0.0072	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.827E-03	0.0644
Pb-210	1.585E-05	0.0002	5.086E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-03	0.0245
Ra-226	2.480E-02	0.3310	1.740E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.203E-04	0.0043
Ra-228	8.247E-04	0.0110	5.836E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.706E-05	0.0002
Th-228	2.686E-03	0.0358	8.108E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.183E-05	0.0003
Th-230	1.169E-03	0.0156	9.125E-03	0.1218	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.765E-02	0.2355
Th-232	1.316E-04	0.0018	4.598E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.072E-05	0.0012
U-234	1.582E-06	0.0000	4.385E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.081E-04	0.0014
U-235	1.283E-04	0.0017	1.771E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.428E-06	0.0001
U-238	5.100E-04	0.0068	3.921E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.027E-04	0.0014
Total	3.570E-02	0.4764	1.107E-02	0.1477	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.817E-02	0.3759

0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0 Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.877E-03	0.1185
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.370E-03	0.0850
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.856E-03	0.0248
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.513E-02	0.3353
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.424E-04	0.0112
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-03	0.0362
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.794E-02	0.3729
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.683E-04	0.0036
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E-04	0.0020
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.345E-04	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.519E-04	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.494E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.054E-03	0.0538	1.157E-03	0.0154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.928E-03	0.0389
Pa-231	1.251E-03	0.0166	6.009E-04	0.0080	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.914E-03	0.0652
Pb-210	1.519E-05	0.0002	4.875E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-03	0.0233
Ra-226	2.440E-02	0.3239	1.847E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.638E-04	0.0048
Ra-228	9.934E-04	0.0132	1.336E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.711E-05	0.0002
Th-228	1.869E-03	0.0248	5.642E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-05	0.0002
Th-230	2.691E-03	0.0357	9.125E-03	0.1211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.767E-02	0.2345
Th-232	4.396E-04	0.0058	4.631E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.646E-05	0.0013
U-234	1.548E-06	0.0000	4.289E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-04	0.0014
U-235	1.255E-04	0.0017	1.733E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.335E-06	0.0001
U-238	4.989E-04	0.0066	3.836E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E-04	0.0013
Total	3.634E-02	0.4824	1.103E-02	0.1463	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.797E-02	0.3713

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.139E-03	0.1080
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.766E-03	0.0898
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.779E-03	0.0236
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E-02	0.3288
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.012E-03	0.0134
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-03	0.0251
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.949E-02	0.3914
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.824E-04	0.0077
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-04	0.0020
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.316E-04	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.376E-04	0.0085
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.534E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.408E-03	0.0445	9.726E-04	0.0127	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-03	0.0321
Pa-231	1.660E-03	0.0217	7.071E-04	0.0092	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.035E-03	0.0657
Pb-210	1.396E-05	0.0002	4.480E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-03	0.0211
Ra-226	2.362E-02	0.3083	2.039E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.428E-04	0.0058
Ra-228	1.055E-03	0.0138	1.919E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.546E-05	0.0002
Th-228	9.051E-04	0.0118	2.732E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.355E-06	0.0001
Th-230	5.663E-03	0.0739	9.125E-03	0.1191	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-02	0.2313
Th-232	1.140E-03	0.0149	4.745E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-04	0.0014
U-234	1.482E-06	0.0000	4.104E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.012E-04	0.0013
U-235	1.201E-04	0.0016	1.659E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.155E-06	0.0001
U-238	4.773E-04	0.0062	3.670E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.606E-05	0.0013
Total	3.807E-02	0.4969	1.094E-02	0.1428	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-02	0.3603

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.842E-03	0.0893
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.403E-03	0.0966
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.634E-03	0.0213
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-02	0.3141
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.072E-03	0.0140
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.152E-04	0.0119
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.251E-02	0.4243
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.295E-03	0.0169
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-04	0.0019
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.259E-04	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.100E-04	0.0080
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.662E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.856E-03	0.0226	5.297E-04	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.341E-03	0.0163
Pa-231	2.468E-03	0.0300	9.042E-04	0.0110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.068E-03	0.0617
Pb-210	1.038E-05	0.0001	3.331E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.202E-03	0.0146
Ra-226	2.108E-02	0.2565	2.519E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.473E-04	0.0079
Ra-228	5.659E-04	0.0069	1.221E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.249E-06	0.0001
Th-228	7.149E-05	0.0009	2.158E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.811E-07	0.0000
Th-230	1.533E-02	0.1866	9.124E-03	0.1110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-02	0.2185
Th-232	3.077E-03	0.0374	5.138E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-04	0.0016
U-234	1.277E-06	0.0000	3.516E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.667E-05	0.0011
U-235	1.029E-04	0.0013	1.425E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.584E-06	0.0000
U-238	4.088E-04	0.0050	3.143E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.228E-05	0.0010
Total	4.498E-02	0.5472	1.068E-02	0.1300	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.653E-02	0.3227

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.726E-03	0.0453
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.440E-03	0.1027
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-03	0.0148
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.173E-02	0.2644
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.743E-04	0.0070
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.228E-05	0.0009
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.241E-02	0.5160
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.262E-03	0.0397
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.231E-04	0.0015
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.079E-04	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.225E-04	0.0064
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.219E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.270E-04	0.0034	9.334E-05	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.362E-04	0.0025
Pa-231	2.436E-03	0.0256	8.236E-04	0.0087	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.869E-03	0.0407
Pb-210	4.453E-06	0.0000	1.429E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.156E-04	0.0054
Ra-226	1.523E-02	0.1600	2.844E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.373E-04	0.0088
Ra-228	3.965E-05	0.0004	8.789E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.957E-07	0.0000
Th-228	5.063E-08	0.0000	1.529E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.117E-10	0.0000
Th-230	3.759E-02	0.3950	9.123E-03	0.0959	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.891E-02	0.1987
Th-232	4.430E-03	0.0466	5.433E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.506E-04	0.0016
U-234	8.700E-07	0.0000	2.260E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.570E-05	0.0006
U-235	6.613E-05	0.0007	9.268E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.360E-06	0.0000
U-238	2.626E-04	0.0028	2.019E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.286E-05	0.0006
Total	6.038E-02	0.6346	1.014E-02	0.1066	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.463E-02	0.2588

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.566E-04	0.0069
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.129E-03	0.0749
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.215E-04	0.0055
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.607E-02	0.1689
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.024E-05	0.0004
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.119E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.562E-02	0.6896
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.635E-03	0.0487
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.917E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.941E-05	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.356E-04	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.515E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.511E-07	0.0000	2.144E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.425E-07	0.0000
Pa-231	5.845E-04	0.0049	1.940E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.697E-04	0.0073
Pb-210	2.304E-07	0.0000	7.394E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.667E-05	0.0002
Ra-226	4.876E-03	0.0408	1.314E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.136E-04	0.0035
Ra-228	2.833E-09	0.0000	6.289E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.545E-11	0.0000
Th-228	4.785E-19	0.0000	1.447E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.897E-21	0.0000
Th-230	7.679E-02	0.6433	9.114E-03	0.0763	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.168E-02	0.1816
Th-232	4.515E-03	0.0378	5.448E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.516E-04	0.0013
U-234	4.419E-07	0.0000	4.837E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.192E-05	0.0001
U-235	1.408E-05	0.0001	2.074E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.487E-07	0.0000
U-238	5.577E-05	0.0005	4.291E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-05	0.0001
Total	8.684E-02	0.7274	9.374E-03	0.0785	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.317E-02	0.1941

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-06	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-03	0.0138
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.698E-05	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.291E-03	0.0443
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.874E-09	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.838E-19	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.076E-01	0.9012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.721E-03	0.0395
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.719E-05	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.484E-05	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.129E-05	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-01	1.0000

0*Sum of all water independent and dependent pathways.

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.167E-14	0.0000	6.187E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E-14	0.0000
Pa-231	6.972E-06	0.0001	2.315E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.037E-05	0.0001
Pb-210	4.871E-11	0.0000	1.563E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.637E-09	0.0000
Ra-226	1.882E-04	0.0014	5.386E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.709E-05	0.0001
Ra-228	4.029E-21	0.0000	8.984E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.064E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	9.383E-02	0.7166	9.069E-03	0.0693	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.313E-02	0.1767
Th-232	4.480E-03	0.0342	5.428E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-04	0.0012
U-234	4.623E-07	0.0000	1.026E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-07	0.0000
U-235	1.697E-07	0.0000	2.846E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.200E-09	0.0000
U-238	6.666E-07	0.0000	5.140E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.345E-07	0.0000
Total	9.851E-02	0.7523	9.125E-03	0.0697	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.331E-02	0.1780

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.351E-14	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.966E-05	0.0002
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.701E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.053E-04	0.0016
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.089E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.260E-01	0.9625
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.686E-03	0.0358
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.210E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.807E-07	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.525E-07	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.283E-12	0.0000	4.278E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.916E-12	0.0000
Pb-210	6.682E-24	0.0000	2.144E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.735E-22	0.0000
Ra-226	2.110E-09	0.0000	6.151E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.951E-10	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	9.110E-02	0.7158	8.895E-03	0.0699	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.275E-02	0.1787
Th-232	4.330E-03	0.0340	5.358E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.491E-04	0.0012
U-234	4.548E-07	0.0000	4.441E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-07	0.0000
U-235	3.251E-14	0.0000	7.709E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-15	0.0000
U-238	5.823E-11	0.0000	5.683E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.454E-11	0.0000
Total	9.543E-02	0.7498	8.948E-03	0.0703	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.290E-02	0.1799

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.627E-12	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.823E-22	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.306E-09	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.227E-01	0.9644
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.533E-03	0.0356
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.128E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.588E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.845E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.273E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227+D	Ac-227+D	9.835E-01	1.249E+00	1.145E+00	9.623E-01	5.241E-01	9.235E-02	2.121E-04	6.120E-12	2.494E-38
0Ac-227+D1	Ac-227+D1	2.722E-03	3.479E-03	3.190E-03	2.681E-03	1.460E-03	2.573E-04	5.910E-07	1.705E-14	6.948E-41
0Ac-227+D2	Ac-227+D2	1.376E-02	1.605E-02	1.472E-02	1.237E-02	6.738E-03	1.187E-03	2.727E-06	7.868E-14	3.207E-40
0Ac-227+D3	Ac-227+D3	3.809E-05	4.475E-05	4.103E-05	3.449E-05	1.879E-05	3.310E-06	7.602E-09	2.194E-16	8.940E-43
0Ac-227+D4	Ac-227+D4	8.257E-07	7.094E-07	6.504E-07	5.468E-07	2.978E-07	5.247E-08	1.205E-10	3.477E-18	1.401E-44
0Ac-227+D5	Ac-227+D5	2.285E-09	1.983E-09	1.818E-09	1.528E-09	8.324E-10	1.467E-10	3.368E-13	9.719E-21	0.000E+00
0Pa-231	Pa-231	9.835E-01	4.275E-01	4.181E-01	4.000E-01	3.426E-01	2.200E-01	4.667E-02	5.562E-04	1.027E-10
Pa-231	Ac-227+D	9.835E-01	2.001E-02	5.722E-02	1.202E-01	2.506E-01	2.812E-01	6.919E-02	8.257E-04	1.523E-10
Pa-231	ΣDSR(j)		4.475E-01	4.753E-01	5.202E-01	5.932E-01	5.011E-01	1.159E-01	1.382E-03	2.550E-10
0Pa-231	Pa-231	2.722E-03	1.183E-03	1.157E-03	1.107E-03	9.481E-04	6.088E-04	1.292E-04	1.539E-06	2.843E-13
Pa-231	Ac-227+D1	2.722E-03	5.576E-05	1.594E-04	3.348E-04	6.983E-04	7.834E-04	1.928E-04	2.301E-06	4.242E-13
Pa-231	ΣDSR(j)		1.239E-03	1.317E-03	1.442E-03	1.646E-03	1.392E-03	3.220E-04	3.840E-06	7.085E-13
0Pa-231	Pa-231	1.376E-02	5.982E-03	5.851E-03	5.597E-03	4.793E-03	3.078E-03	6.530E-04	7.782E-06	1.437E-12
Pa-231	Ac-227+D2	1.376E-02	2.573E-04	7.357E-04	1.545E-03	3.222E-03	3.615E-03	8.896E-04	1.062E-05	1.958E-12
Pa-231	ΣDSR(j)		6.239E-03	6.586E-03	7.142E-03	8.015E-03	6.693E-03	1.543E-03	1.840E-05	3.395E-12
0Pa-231	Pa-231	3.809E-05	1.655E-05	1.619E-05	1.549E-05	1.327E-05	8.518E-06	1.807E-06	2.154E-08	3.978E-15
Pa-231	Ac-227+D3	3.809E-05	7.173E-07	2.051E-06	4.307E-06	8.983E-06	1.008E-05	2.480E-06	2.960E-08	5.459E-15
Pa-231	ΣDSR(j)		1.727E-05	1.824E-05	1.980E-05	2.225E-05	1.860E-05	4.287E-06	5.113E-08	9.437E-15
0Pa-231	Pa-231	8.257E-07	3.589E-07	3.511E-07	3.358E-07	2.876E-07	1.847E-07	3.918E-08	4.669E-10	8.624E-17
Pa-231	Ac-227+D4	8.257E-07	1.137E-08	3.251E-08	6.827E-08	1.424E-07	1.597E-07	3.931E-08	4.691E-10	8.656E-17
Pa-231	ΣDSR(j)		3.703E-07	3.836E-07	4.041E-07	4.300E-07	3.444E-07	7.850E-08	9.361E-10	1.728E-16
0Pa-231	Pa-231	2.285E-09	9.933E-10	9.716E-10	9.295E-10	7.960E-10	5.111E-10	1.084E-10	1.292E-12	2.387E-19
Pa-231	Ac-227+D5	2.285E-09	3.178E-11	9.088E-11	1.908E-10	3.980E-10	4.465E-10	1.099E-10	1.311E-12	2.419E-19
Pa-231	ΣDSR(j)		1.025E-09	1.062E-09	1.120E-09	1.194E-09	9.577E-10	2.183E-10	2.604E-12	4.806E-19
0Pb-210+D	Pb-210+D	1.000E+00	2.319E-01	2.223E-01	2.043E-01	1.519E-01	6.518E-02	3.372E-03	7.126E-07	9.779E-20
0Pb-210+D1	Pb-210+D1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D2	Pb-210+D2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D3	Pb-210+D3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Ra-226+D	Ra-226+D	9.996E-01	3.584E+00	3.526E+00	3.414E+00	3.046E+00	2.200E+00	7.043E-01	2.718E-02	3.048E-07
Ra-226+D	Pb-210+D1	9.996E-01	3.625E-03	1.060E-02	2.335E-02	5.725E-02	9.475E-02	5.135E-02	2.143E-03	2.448E-08
Ra-226+D	ΣDSR(j)		3.588E+00	3.537E+00	3.437E+00	3.103E+00	2.295E+00	7.556E-01	2.932E-02	3.293E-07

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D	Ra-226+D	1.319E-06	4.731E-06	4.655E-06	4.506E-06	4.021E-06	2.904E-06	9.296E-07	3.587E-08	4.024E-13
Ra-226+D	Pb-210+D2	1.319E-06	3.595E-09	1.051E-08	2.315E-08	5.677E-08	9.397E-08	5.092E-08	2.126E-09	2.427E-14
Ra-226+D	ΣDSR(j)		4.735E-06	4.665E-06	4.529E-06	4.078E-06	2.998E-06	9.805E-07	3.800E-08	4.266E-13
0Ra-226+D	Ra-226+D	1.899E-08	6.810E-08	6.700E-08	6.486E-08	5.788E-08	4.180E-08	1.338E-08	5.163E-10	5.791E-15
Ra-226+D	Pb-210+D3	1.899E-08	5.134E-11	1.501E-10	3.307E-10	8.108E-10	1.342E-09	7.272E-10	3.035E-11	3.467E-16
Ra-226+D	ΣDSR(j)		6.815E-08	6.715E-08	6.519E-08	5.869E-08	4.314E-08	1.411E-08	5.467E-10	6.138E-15
0Ra-226+D1	Ra-226+D1	2.100E-04	7.528E-04	7.407E-04	7.170E-04	6.398E-04	4.621E-04	1.479E-04	5.708E-06	6.402E-11
Ra-226+D1	Pb-210+D1	2.100E-04	7.615E-07	2.226E-06	4.904E-06	1.202E-05	1.990E-05	1.078E-05	4.502E-07	5.141E-12
Ra-226+D1	ΣDSR(j)		7.536E-04	7.429E-04	7.219E-04	6.518E-04	4.820E-04	1.587E-04	6.158E-06	6.916E-11
0Ra-226+D1	Ra-226+D1	2.771E-10	9.937E-10	9.777E-10	9.464E-10	8.445E-10	6.099E-10	1.953E-10	7.534E-12	8.451E-17
Ra-226+D1	Pb-210+D2	2.771E-10	7.552E-13	2.207E-12	4.864E-12	1.192E-11	1.974E-11	1.070E-11	4.465E-13	5.099E-18
Ra-226+D1	ΣDSR(j)		9.945E-10	9.799E-10	9.513E-10	8.564E-10	6.297E-10	2.059E-10	7.981E-12	8.961E-17
0Ra-226+D1	Ra-226+D1	3.989E-12	1.430E-11	1.407E-11	1.362E-11	1.216E-11	8.779E-12	2.810E-12	1.084E-13	1.216E-18
Ra-226+D1	Pb-210+D3	3.989E-12	1.078E-14	3.152E-14	6.946E-14	1.703E-13	2.819E-13	1.527E-13	6.376E-15	7.282E-20
Ra-226+D1	ΣDSR(j)		1.431E-11	1.410E-11	1.369E-11	1.233E-11	9.061E-12	2.963E-12	1.148E-13	1.289E-18
0Ra-226+D2	Ra-226+D2	1.998E-04	6.297E-04	6.195E-04	5.997E-04	5.351E-04	3.864E-04	1.237E-04	4.771E-06	5.342E-11
Ra-226+D2	Pb-210+D1	1.998E-04	7.245E-07	2.118E-06	4.666E-06	1.144E-05	1.894E-05	1.026E-05	4.283E-07	4.892E-12
Ra-226+D2	ΣDSR(j)		6.304E-04	6.216E-04	6.043E-04	5.465E-04	4.054E-04	1.340E-04	5.200E-06	5.831E-11
0Ra-226+D2	Ra-226+D2	2.637E-10	8.311E-10	8.177E-10	7.915E-10	7.063E-10	5.101E-10	1.633E-10	6.298E-12	7.051E-17
Ra-226+D2	Pb-210+D2	2.637E-10	7.185E-13	2.100E-12	4.627E-12	1.135E-11	1.878E-11	1.018E-11	4.248E-13	4.851E-18
Ra-226+D2	ΣDSR(j)		8.319E-10	8.198E-10	7.962E-10	7.177E-10	5.289E-10	1.735E-10	6.723E-12	7.536E-17
0Ra-226+D2	Ra-226+D2	3.795E-12	1.196E-11	1.177E-11	1.139E-11	1.017E-11	7.342E-12	2.350E-12	9.065E-14	1.015E-18
Ra-226+D2	Pb-210+D3	3.795E-12	1.026E-14	2.999E-14	6.608E-14	1.620E-13	2.682E-13	1.453E-13	6.066E-15	6.928E-20
Ra-226+D2	ΣDSR(j)		1.197E-11	1.180E-11	1.146E-11	1.033E-11	7.611E-12	2.496E-12	9.672E-14	1.084E-18
0Ra-226+D3	Ra-226+D3	4.196E-08	1.322E-07	1.301E-07	1.259E-07	1.124E-07	8.117E-08	2.598E-08	1.002E-09	1.122E-14
Ra-226+D3	Pb-210+D1	4.196E-08	1.522E-10	4.448E-10	9.801E-10	2.403E-09	3.977E-09	2.155E-09	8.997E-11	1.027E-15
Ra-226+D3	ΣDSR(j)		1.324E-07	1.306E-07	1.269E-07	1.148E-07	8.514E-08	2.814E-08	1.092E-09	1.225E-14
0Ra-226+D3	Ra-226+D3	5.538E-14	1.746E-13	1.718E-13	1.663E-13	1.484E-13	1.071E-13	3.429E-14	1.323E-15	1.481E-20
Ra-226+D3	Pb-210+D2	5.538E-14	1.509E-16	4.411E-16	9.719E-16	2.383E-15	3.944E-15	2.137E-15	8.922E-17	1.019E-21
Ra-226+D3	ΣDSR(j)		1.747E-13	1.722E-13	1.672E-13	1.507E-13	1.111E-13	3.643E-14	1.412E-15	1.583E-20
0Ra-226+D3	Ra-226+D3	7.972E-16	2.513E-15	2.472E-15	2.393E-15	2.135E-15	1.542E-15	4.936E-16	1.904E-17	2.132E-22
Ra-226+D3	Pb-210+D3	7.972E-16	2.155E-18	6.300E-18	1.388E-17	3.403E-17	5.633E-17	3.052E-17	1.274E-18	1.455E-23
Ra-226+D3	ΣDSR(j)		2.515E-15	2.478E-15	2.407E-15	2.169E-15	1.598E-15	5.241E-16	2.031E-17	2.277E-22
0Ra-226+D4	Ra-226+D4	2.000E-07	1.142E-08	1.123E-08	1.087E-08	9.703E-09	7.010E-09	2.246E-09	8.695E-11	9.921E-16
Ra-226+D4	Pb-210+D1	2.000E-07	7.254E-10	2.120E-09	4.672E-09	1.145E-08	1.896E-08	1.027E-08	4.288E-10	4.897E-15
Ra-226+D4	ΣDSR(j)		1.214E-08	1.335E-08	1.554E-08	2.116E-08	2.597E-08	1.252E-08	5.158E-10	5.890E-15

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 26
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D4	Ra-226+D4	2.640E-13	1.507E-14	1.483E-14	1.435E-14	1.281E-14	9.253E-15	2.965E-15	1.148E-16	1.310E-21
Ra-226+D4	Pb-210+D2	2.640E-13	7.193E-16	2.103E-15	4.633E-15	1.136E-14	1.880E-14	1.019E-14	4.253E-16	4.857E-21
Ra-226+D4	ΣDSR(j)		1.579E-14	1.693E-14	1.898E-14	2.417E-14	2.805E-14	1.315E-14	5.401E-16	6.166E-21
0Ra-226+D4	Ra-226+D4	3.800E-15	2.169E-16	2.134E-16	2.066E-16	1.844E-16	1.332E-16	4.268E-17	1.652E-18	1.885E-23
Ra-226+D4	Pb-210+D3	3.800E-15	1.027E-17	3.003E-17	6.616E-17	1.622E-16	2.685E-16	1.455E-16	6.073E-18	6.936E-23
Ra-226+D4	ΣDSR(j)		2.272E-16	2.434E-16	2.727E-16	3.466E-16	4.017E-16	1.882E-16	7.726E-18	8.821E-23
0Ra-228+D	Ra-228+D	1.000E+00	1.841E+00	1.607E+00	1.223E+00	4.708E-01	3.078E-02	2.198E-06	3.132E-18	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	4.985E-01	1.204E+00	1.756E+00	1.125E+00	8.099E-02	5.786E-06	8.225E-18	0.000E+00
Ra-228+D	ΣDSR(j)		2.340E+00	2.811E+00	2.979E+00	1.595E+00	1.118E-01	7.985E-06	1.136E-17	0.000E+00
0Th-228+D	Th-228+D	1.000E+00	2.716E+00	1.890E+00	9.152E-01	7.228E-02	5.119E-05	4.838E-16	0.000E+00	0.000E+00
0Th-230	Th-230	9.996E-01	2.715E-02	2.715E-02	2.715E-02	2.715E-02	2.713E-02	2.708E-02	2.693E-02	2.641E-02
Th-230	Ra-226+D	9.996E-01	7.785E-04	2.319E-03	5.325E-03	1.511E-02	3.761E-02	7.725E-02	9.448E-02	9.175E-02
Th-230	Pb-210+D1	9.996E-01	5.261E-07	3.622E-06	1.844E-05	1.445E-04	8.499E-04	3.217E-03	4.571E-03	4.540E-03
Th-230	ΣDSR(j)		2.793E-02	2.947E-02	3.249E-02	4.240E-02	6.559E-02	1.075E-01	1.260E-01	1.227E-01
0Th-230	Th-230	1.319E-06	3.584E-08	3.584E-08	3.584E-08	3.583E-08	3.581E-08	3.574E-08	3.554E-08	3.486E-08
Th-230	Ra-226+D	1.319E-06	1.028E-09	3.061E-09	7.029E-09	1.994E-08	4.965E-08	1.020E-07	1.247E-07	1.211E-07
Th-230	Pb-210+D2	1.319E-06	5.217E-13	3.592E-12	1.829E-11	1.433E-10	8.428E-10	3.191E-09	4.533E-09	4.502E-09
Th-230	ΣDSR(j)		3.687E-08	3.890E-08	4.289E-08	5.591E-08	8.630E-08	1.409E-07	1.648E-07	1.605E-07
0Th-230	Th-230	1.899E-08	5.159E-10	5.159E-10	5.159E-10	5.158E-10	5.155E-10	5.145E-10	5.116E-10	5.018E-10
Th-230	Ra-226+D	1.899E-08	1.479E-11	4.405E-11	1.012E-10	2.870E-10	7.146E-10	1.468E-09	1.795E-09	1.743E-09
Th-230	Pb-210+D3	1.899E-08	7.450E-15	5.129E-14	2.611E-13	2.046E-12	1.204E-11	4.557E-11	6.474E-11	6.429E-11
Th-230	ΣDSR(j)		5.307E-10	5.600E-10	6.173E-10	8.048E-10	1.242E-09	2.028E-09	2.372E-09	2.309E-09
0Th-230	Th-230	2.100E-04	5.703E-06	5.703E-06	5.703E-06	5.702E-06	5.698E-06	5.687E-06	5.656E-06	5.547E-06
Th-230	Ra-226+D1	2.100E-04	1.635E-07	4.870E-07	1.118E-06	3.173E-06	7.900E-06	1.623E-05	1.985E-05	1.927E-05
Th-230	Pb-210+D1	2.100E-04	1.105E-10	7.607E-10	3.873E-09	3.035E-08	1.785E-07	6.758E-07	9.602E-07	9.535E-07
Th-230	ΣDSR(j)		5.867E-06	6.191E-06	6.825E-06	8.905E-06	1.378E-05	2.259E-05	2.646E-05	2.577E-05
0Th-230	Th-230	2.771E-10	7.528E-12	7.528E-12	7.528E-12	7.526E-12	7.522E-12	7.507E-12	7.466E-12	7.323E-12
Th-230	Ra-226+D1	2.771E-10	2.158E-13	6.428E-13	1.476E-12	4.188E-12	1.043E-11	2.142E-11	2.620E-11	2.544E-11
Th-230	Pb-210+D2	2.771E-10	1.096E-16	7.544E-16	3.841E-15	3.010E-14	1.770E-13	6.702E-13	9.522E-13	9.456E-13
Th-230	ΣDSR(j)		7.744E-12	8.172E-12	9.008E-12	1.174E-11	1.813E-11	2.960E-11	3.461E-11	3.371E-11
0Th-230	Th-230	3.989E-12	1.084E-13	1.084E-13	1.084E-13	1.083E-13	1.083E-13	1.081E-13	1.075E-13	1.054E-13
Th-230	Ra-226+D1	3.989E-12	3.107E-15	9.253E-15	2.125E-14	6.028E-14	1.501E-13	3.083E-13	3.771E-13	3.661E-13
Th-230	Pb-210+D3	3.989E-12	1.565E-18	1.077E-17	5.485E-17	4.298E-16	2.528E-15	9.571E-15	1.360E-14	1.350E-14
Th-230	ΣDSR(j)		1.115E-13	1.176E-13	1.297E-13	1.690E-13	2.609E-13	4.259E-13	4.981E-13	4.850E-13

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 27
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.998E-04	5.426E-06	5.426E-06	5.426E-06	5.425E-06	5.422E-06	5.411E-06	5.381E-06	5.278E-06
Th-230	Ra-226+D2	1.998E-04	1.368E-07	4.073E-07	9.354E-07	2.654E-06	6.607E-06	1.357E-05	1.659E-05	1.608E-05
Th-230	Pb-210+D1	1.998E-04	1.051E-10	7.238E-10	3.685E-09	2.887E-08	1.698E-07	6.429E-07	9.135E-07	9.072E-07
Th-230	ΣDSR(j)		5.563E-06	5.834E-06	6.365E-06	8.107E-06	1.220E-05	1.962E-05	2.288E-05	2.226E-05
0Th-230	Th-230	2.637E-10	7.163E-12	7.162E-12	7.162E-12	7.161E-12	7.157E-12	7.143E-12	7.103E-12	6.967E-12
Th-230	Ra-226+D2	2.637E-10	1.805E-13	5.377E-13	1.235E-12	3.503E-12	8.721E-12	1.791E-11	2.190E-11	2.122E-11
Th-230	Pb-210+D2	2.637E-10	1.043E-16	7.177E-16	3.654E-15	2.864E-14	1.684E-13	6.376E-13	9.060E-13	8.997E-13
Th-230	ΣDSR(j)		7.343E-12	7.701E-12	8.400E-12	1.069E-11	1.605E-11	2.569E-11	2.991E-11	2.909E-11
0Th-230	Th-230	3.795E-12	1.031E-13	1.031E-13	1.031E-13	1.031E-13	1.030E-13	1.028E-13	1.022E-13	1.003E-13
Th-230	Ra-226+D2	3.795E-12	2.598E-15	7.739E-15	1.777E-14	5.042E-14	1.255E-13	2.578E-13	3.152E-13	3.055E-13
Th-230	Pb-210+D3	3.795E-12	1.489E-18	1.025E-17	5.218E-17	4.089E-16	2.405E-15	9.106E-15	1.294E-14	1.285E-14
Th-230	ΣDSR(j)		1.057E-13	1.108E-13	1.209E-13	1.539E-13	2.309E-13	3.697E-13	4.304E-13	4.186E-13
0Th-230	Th-230	4.196E-08	1.140E-09	1.140E-09	1.140E-09	1.139E-09	1.139E-09	1.137E-09	1.130E-09	1.109E-09
Th-230	Ra-226+D3	4.196E-08	2.872E-11	8.555E-11	1.965E-10	5.573E-10	1.388E-09	2.850E-09	3.484E-09	3.377E-09
Th-230	Pb-210+D1	4.196E-08	2.208E-14	1.520E-13	7.739E-13	6.065E-12	3.567E-11	1.350E-10	1.919E-10	1.906E-10
Th-230	ΣDSR(j)		1.168E-09	1.225E-09	1.337E-09	1.703E-09	2.562E-09	4.121E-09	4.806E-09	4.676E-09
0Th-230	Th-230	5.538E-14	1.504E-15	1.504E-15	1.504E-15	1.504E-15	1.503E-15	1.500E-15	1.492E-15	1.463E-15
Th-230	Ra-226+D3	5.538E-14	3.791E-17	1.129E-16	2.593E-16	7.357E-16	1.832E-15	3.762E-15	4.599E-15	4.458E-15
Th-230	Pb-210+D2	5.538E-14	2.190E-20	1.508E-19	7.675E-19	6.015E-18	3.538E-17	1.339E-16	1.903E-16	1.890E-16
Th-230	ΣDSR(j)		1.542E-15	1.617E-15	1.764E-15	2.246E-15	3.370E-15	5.396E-15	6.281E-15	6.110E-15
0Th-230	Th-230	7.972E-16	2.165E-17	2.165E-17	2.165E-17	2.165E-17	2.164E-17	2.160E-17	2.148E-17	2.106E-17
Th-230	Ra-226+D3	7.972E-16	5.457E-19	1.625E-18	3.733E-18	1.059E-17	2.637E-17	5.415E-17	6.620E-17	6.417E-17
Th-230	Pb-210+D3	7.972E-16	3.127E-22	2.153E-21	1.096E-20	8.589E-20	5.052E-19	1.913E-18	2.718E-18	2.699E-18
Th-230	ΣDSR(j)		2.220E-17	2.328E-17	2.540E-17	3.232E-17	4.851E-17	7.765E-17	9.039E-17	8.793E-17
0Th-230	Th-230	2.000E-07	5.433E-09	5.433E-09	5.432E-09	5.431E-09	5.428E-09	5.418E-09	5.388E-09	5.284E-09
Th-230	Ra-226+D4	2.000E-07	2.479E-12	7.385E-12	1.696E-11	4.812E-11	1.198E-10	2.464E-10	3.023E-10	2.986E-10
Th-230	Pb-210+D1	2.000E-07	1.053E-13	7.246E-13	3.689E-12	2.891E-11	1.701E-10	6.437E-10	9.146E-10	9.083E-10
Th-230	ΣDSR(j)		5.435E-09	5.441E-09	5.453E-09	5.508E-09	5.718E-09	6.308E-09	6.605E-09	6.491E-09
0Th-230	Th-230	2.640E-13	7.171E-15	7.171E-15	7.171E-15	7.169E-15	7.165E-15	7.151E-15	7.112E-15	6.975E-15
Th-230	Ra-226+D4	2.640E-13	3.273E-18	9.748E-18	2.239E-17	6.351E-17	1.582E-16	3.252E-16	3.991E-16	3.942E-16
Th-230	Pb-210+D2	2.640E-13	1.044E-19	7.186E-19	3.659E-18	2.867E-17	1.686E-16	6.384E-16	9.071E-16	9.008E-16
Th-230	ΣDSR(j)		7.175E-15	7.181E-15	7.197E-15	7.261E-15	7.492E-15	8.115E-15	8.418E-15	8.270E-15
0Th-230	Th-230	3.800E-15	1.032E-16	1.032E-16	1.032E-16	1.032E-16	1.031E-16	1.029E-16	1.024E-16	1.004E-16
Th-230	Ra-226+D4	3.800E-15	4.711E-20	1.403E-19	3.222E-19	9.142E-19	2.277E-18	4.681E-18	5.744E-18	5.674E-18
Th-230	Pb-210+D3	3.800E-15	1.491E-21	1.026E-20	5.225E-20	4.094E-19	2.408E-18	9.117E-18	1.295E-17	1.286E-17
Th-230	ΣDSR(j)		1.033E-16	1.034E-16	1.036E-16	1.045E-16	1.078E-16	1.167E-16	1.211E-16	1.189E-16

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	1.340E-01	1.340E-01	1.339E-01	1.339E-01	1.339E-01	1.337E-01	1.332E-01	1.315E-01
Th-232	Ra-228+D	1.000E+00	1.135E-01	3.210E-01	6.600E-01	1.325E+00	1.713E+00	1.736E+00	1.725E+00	1.678E+00
Th-232	Th-228+D	1.000E+00	2.087E-02	1.275E-01	5.013E-01	1.804E+00	2.788E+00	2.851E+00	2.827E+00	2.723E+00
Th-232	ΣDSR(j)		2.683E-01	5.824E-01	1.295E+00	3.262E+00	4.635E+00	4.721E+00	4.686E+00	4.533E+00
0U-234	U-234	9.996E-01	1.279E-02	1.251E-02	1.197E-02	1.025E-02	6.585E-03	1.399E-03	1.673E-05	3.132E-12
U-234	Th-230	9.996E-01	1.239E-07	3.681E-07	8.406E-07	2.339E-06	5.535E-06	1.004E-05	1.119E-05	1.099E-05
U-234	Ra-226+D	9.996E-01	2.376E-09	1.645E-08	8.484E-08	6.948E-07	4.576E-06	2.250E-05	3.862E-05	3.817E-05
U-234	Pb-210+D1	9.996E-01	1.208E-12	1.780E-11	1.999E-10	4.617E-09	7.687E-08	8.188E-07	1.851E-06	1.889E-06
U-234	ΣDSR(j)		1.279E-02	1.251E-02	1.197E-02	1.025E-02	6.595E-03	1.432E-03	6.839E-05	5.105E-05
0U-234	U-234	1.319E-06	1.688E-08	1.651E-08	1.580E-08	1.353E-08	8.692E-09	1.846E-09	2.209E-11	4.134E-18
U-234	Th-230	1.319E-06	1.636E-13	4.859E-13	1.110E-12	3.087E-12	7.306E-12	1.326E-11	1.477E-11	1.450E-11
U-234	Ra-226+D	1.319E-06	3.137E-15	2.172E-14	1.120E-13	9.172E-13	6.040E-12	2.971E-11	5.097E-11	5.039E-11
U-234	Pb-210+D2	1.319E-06	1.198E-18	1.766E-17	1.982E-16	4.579E-15	7.623E-14	8.121E-13	1.835E-12	1.873E-12
U-234	ΣDSR(j)		1.688E-08	1.651E-08	1.580E-08	1.354E-08	8.706E-09	1.890E-09	8.967E-11	6.676E-11
0U-234	U-234	1.899E-08	2.430E-10	2.377E-10	2.274E-10	1.948E-10	1.251E-10	2.658E-11	3.179E-13	5.950E-20
U-234	Th-230	1.899E-08	2.355E-15	6.995E-15	1.597E-14	4.444E-14	1.052E-13	1.908E-13	2.126E-13	2.088E-13
U-234	Ra-226+D	1.899E-08	4.515E-17	3.126E-16	1.612E-15	1.320E-14	8.694E-14	4.276E-13	7.337E-13	7.252E-13
U-234	Pb-210+D3	1.899E-08	1.710E-20	2.522E-19	2.831E-18	6.539E-17	1.089E-15	1.160E-14	2.621E-14	2.675E-14
U-234	ΣDSR(j)		2.430E-10	2.377E-10	2.274E-10	1.948E-10	1.253E-10	2.721E-11	1.290E-12	9.608E-13
0U-234	U-234	2.100E-04	2.687E-06	2.628E-06	2.514E-06	2.153E-06	1.383E-06	2.938E-07	3.515E-09	6.578E-16
U-234	Th-230	2.100E-04	2.603E-11	7.733E-11	1.766E-10	4.913E-10	1.163E-09	2.110E-09	2.350E-09	2.308E-09
U-234	Ra-226+D1	2.100E-04	4.991E-13	3.456E-12	1.782E-11	1.459E-10	9.611E-10	4.727E-09	8.111E-09	8.017E-09
U-234	Pb-210+D1	2.100E-04	2.536E-16	3.740E-15	4.198E-14	9.698E-13	1.615E-11	1.720E-10	3.887E-10	3.967E-10
U-234	ΣDSR(j)		2.687E-06	2.628E-06	2.514E-06	2.154E-06	1.385E-06	3.008E-07	1.436E-08	1.072E-08
0U-234	U-234	2.771E-10	3.546E-12	3.469E-12	3.318E-12	2.842E-12	1.826E-12	3.878E-13	4.639E-15	8.683E-22
U-234	Th-230	2.771E-10	3.436E-17	1.021E-16	2.331E-16	6.485E-16	1.535E-15	2.785E-15	3.102E-15	3.046E-15
U-234	Ra-226+D1	2.771E-10	6.588E-19	4.561E-18	2.352E-17	1.926E-16	1.269E-15	6.239E-15	1.071E-14	1.058E-14
U-234	Pb-210+D2	2.771E-10	2.515E-22	3.709E-21	4.164E-20	9.618E-19	1.601E-17	1.706E-16	3.855E-16	3.934E-16
U-234	ΣDSR(j)		3.546E-12	3.469E-12	3.319E-12	2.843E-12	1.829E-12	3.970E-13	1.883E-14	1.402E-14
0U-234	U-234	3.989E-12	5.104E-14	4.993E-14	4.777E-14	4.091E-14	2.628E-14	5.583E-15	6.678E-17	1.250E-23
U-234	Th-230	3.989E-12	4.946E-19	1.469E-18	3.355E-18	9.334E-18	2.209E-17	4.008E-17	4.465E-17	4.385E-17
U-234	Ra-226+D1	3.989E-12	9.483E-21	6.566E-20	3.385E-19	2.773E-18	1.826E-17	8.981E-17	1.541E-16	1.523E-16
U-234	Pb-210+D3	3.989E-12	3.592E-24	5.296E-23	5.946E-22	1.374E-20	2.287E-19	2.436E-18	5.505E-18	5.618E-18
U-234	ΣDSR(j)		5.104E-14	4.993E-14	4.777E-14	4.092E-14	2.632E-14	5.715E-15	2.710E-16	2.018E-16
0U-234	U-234	1.998E-04	2.556E-06	2.500E-06	2.392E-06	2.049E-06	1.316E-06	2.795E-07	3.344E-09	6.259E-16
U-234	Th-230	1.998E-04	2.476E-11	7.357E-11	1.680E-10	4.674E-10	1.106E-09	2.007E-09	2.236E-09	2.196E-09
U-234	Ra-226+D2	1.998E-04	4.174E-13	2.890E-12	1.490E-11	1.221E-10	8.038E-10	3.953E-09	6.780E-09	6.689E-09
U-234	Pb-210+D1	1.998E-04	2.413E-16	3.558E-15	3.995E-14	9.227E-13	1.536E-11	1.636E-10	3.698E-10	3.774E-10
U-234	ΣDSR(j)		2.556E-06	2.500E-06	2.392E-06	2.049E-06	1.318E-06	2.857E-07	1.273E-08	9.263E-09

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.637E-10	3.374E-12	3.300E-12	3.157E-12	2.704E-12	1.737E-12	3.690E-13	4.414E-15	8.261E-22
U-234	Th-230	2.637E-10	3.269E-17	9.711E-17	2.218E-16	6.170E-16	1.460E-15	2.649E-15	2.951E-15	2.898E-15
U-234	Ra-226+D2	2.637E-10	5.510E-19	3.815E-18	1.967E-17	1.611E-16	1.061E-15	5.217E-15	8.950E-15	8.830E-15
U-234	Pb-210+D2	2.637E-10	2.393E-22	3.529E-21	3.961E-20	9.150E-19	1.523E-17	1.623E-16	3.668E-16	3.743E-16
U-234	ΣDSR(j)		3.374E-12	3.300E-12	3.157E-12	2.705E-12	1.740E-12	3.770E-13	1.668E-14	1.210E-14
0U-234	U-234	3.795E-12	4.856E-14	4.750E-14	4.544E-14	3.892E-14	2.500E-14	5.311E-15	6.353E-17	1.189E-23
U-234	Th-230	3.795E-12	4.705E-19	1.398E-18	3.192E-18	8.880E-18	2.102E-17	3.813E-17	4.248E-17	4.172E-17
U-234	Ra-226+D2	3.795E-12	7.931E-21	5.491E-20	2.832E-19	2.319E-18	1.527E-17	7.510E-17	1.288E-16	1.271E-16
U-234	Pb-210+D3	3.795E-12	3.418E-24	5.039E-23	5.657E-22	1.307E-20	2.176E-19	2.318E-18	5.238E-18	5.345E-18
U-234	ΣDSR(j)		4.856E-14	4.750E-14	4.545E-14	3.893E-14	2.504E-14	5.427E-15	2.401E-16	1.742E-16
0U-234	U-234	4.196E-08	5.369E-10	5.251E-10	5.024E-10	4.303E-10	2.764E-10	5.872E-11	7.023E-13	1.315E-19
U-234	Th-230	4.196E-08	5.202E-15	1.545E-14	3.529E-14	9.817E-14	2.323E-13	4.216E-13	4.696E-13	4.612E-13
U-234	Ra-226+D3	4.196E-08	8.767E-17	6.070E-16	3.130E-15	2.564E-14	1.688E-13	8.302E-13	1.424E-12	1.405E-12
U-234	Pb-210+D1	4.196E-08	5.069E-20	7.474E-19	8.390E-18	1.938E-16	3.227E-15	3.437E-14	7.768E-14	7.928E-14
U-234	ΣDSR(j)		5.369E-10	5.251E-10	5.024E-10	4.304E-10	2.768E-10	6.000E-11	2.674E-12	1.945E-12
0U-234	U-234	5.538E-14	7.087E-16	6.932E-16	6.632E-16	5.680E-16	3.649E-16	7.751E-17	9.271E-19	1.735E-25
U-234	Th-230	5.538E-14	6.866E-21	2.040E-20	4.658E-20	1.296E-19	3.067E-19	5.565E-19	6.199E-19	6.088E-19
U-234	Ra-226+D3	5.538E-14	1.157E-22	8.013E-22	4.132E-21	3.384E-20	2.229E-19	1.096E-18	1.880E-18	1.855E-18
U-234	Pb-210+D2	5.538E-14	5.027E-26	7.412E-25	8.321E-24	1.922E-22	3.200E-21	3.409E-20	7.703E-20	7.862E-20
U-234	ΣDSR(j)		7.087E-16	6.932E-16	6.632E-16	5.682E-16	3.654E-16	7.919E-17	3.504E-18	2.542E-18
0U-234	U-234	7.972E-16	1.020E-17	9.977E-18	9.545E-18	8.176E-18	5.252E-18	1.116E-18	1.334E-20	2.498E-27
U-234	Th-230	7.972E-16	9.883E-23	2.936E-22	6.704E-22	1.865E-21	4.414E-21	8.010E-21	8.923E-21	8.763E-21
U-234	Ra-226+D3	7.972E-16	1.666E-24	1.153E-23	5.947E-23	4.871E-22	3.208E-21	1.577E-20	2.706E-20	2.670E-20
U-234	Pb-210+D3	7.972E-16	7.178E-28	1.058E-26	1.188E-25	2.745E-24	4.570E-23	4.868E-22	1.100E-21	1.123E-21
U-234	ΣDSR(j)		1.020E-17	9.978E-18	9.546E-18	8.178E-18	5.259E-18	1.140E-18	5.042E-20	3.658E-20
0U-234	U-234	2.000E-07	2.559E-09	2.503E-09	2.395E-09	2.051E-09	1.318E-09	2.799E-10	3.348E-12	6.266E-19
U-234	Th-230	2.000E-07	2.479E-14	7.366E-14	1.682E-13	4.680E-13	1.107E-12	2.009E-12	2.239E-12	2.198E-12
U-234	Ra-226+D4	2.000E-07	7.568E-18	5.240E-17	2.702E-16	2.213E-15	1.458E-14	7.178E-14	1.236E-13	1.242E-13
U-234	Pb-210+D1	2.000E-07	2.416E-19	3.562E-18	3.999E-17	9.238E-16	1.538E-14	1.638E-13	3.703E-13	3.779E-13
U-234	ΣDSR(j)		2.559E-09	2.503E-09	2.395E-09	2.052E-09	1.319E-09	2.821E-10	6.080E-12	2.701E-12
0U-234	U-234	2.640E-13	3.378E-15	3.304E-15	3.161E-15	2.707E-15	1.739E-15	3.695E-16	4.419E-18	8.271E-25
U-234	Th-230	2.640E-13	3.273E-20	9.723E-20	2.220E-19	6.177E-19	1.462E-18	2.652E-18	2.955E-18	2.902E-18
U-234	Ra-226+D4	2.640E-13	9.990E-24	6.917E-23	3.567E-22	2.922E-21	1.925E-20	9.474E-20	1.631E-19	1.640E-19
U-234	Pb-210+D2	2.640E-13	2.396E-25	3.533E-24	3.966E-23	9.162E-22	1.525E-20	1.625E-19	3.672E-19	3.748E-19
U-234	ΣDSR(j)		3.378E-15	3.304E-15	3.161E-15	2.708E-15	1.741E-15	3.724E-16	7.904E-18	3.441E-18
0U-234	U-234	3.800E-15	4.862E-17	4.756E-17	4.550E-17	3.897E-17	2.503E-17	5.318E-18	6.361E-20	1.191E-26
U-234	Th-230	3.800E-15	4.711E-22	1.400E-21	3.196E-21	8.891E-21	2.104E-20	3.818E-20	4.253E-20	4.177E-20
U-234	Ra-226+D4	3.800E-15	1.438E-25	9.956E-25	5.134E-24	4.205E-23	2.770E-22	1.364E-21	2.348E-21	2.360E-21
U-234	Pb-210+D3	3.800E-15	3.422E-27	5.045E-26	5.664E-25	1.308E-23	2.178E-22	2.320E-21	5.244E-21	5.352E-21
U-234	ΣDSR(j)		4.862E-17	4.756E-17	4.550E-17	3.898E-17	2.505E-17	5.360E-18	1.137E-19	4.948E-20

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-235+D	U-235+D	9.835E-01	2.545E-01	2.489E-01	2.381E-01	2.039E-01	1.310E-01	2.784E-02	3.333E-04	6.245E-11
U-235+D	Pa-231	9.835E-01	4.506E-06	1.325E-05	2.961E-05	7.610E-05	1.420E-04	9.934E-05	3.547E-06	2.198E-12
U-235+D	Ac-227+D	9.835E-01	1.416E-07	9.553E-07	4.644E-06	3.098E-05	1.188E-04	1.248E-04	4.995E-06	3.207E-12
U-235+D	ΣDSR(j)		2.545E-01	2.489E-01	2.381E-01	2.041E-01	1.313E-01	2.807E-02	3.418E-04	6.786E-11
0U-235+D	U-235+D	2.722E-03	7.042E-04	6.888E-04	6.590E-04	5.644E-04	3.626E-04	7.705E-05	9.224E-07	1.728E-13
U-235+D	Pa-231	2.722E-03	1.247E-08	3.668E-08	8.194E-08	2.106E-07	3.930E-07	2.749E-07	9.818E-09	6.082E-15
U-235+D	Ac-227+D1	2.722E-03	3.947E-10	2.662E-09	1.294E-08	8.632E-08	3.310E-07	3.478E-07	1.392E-08	8.935E-15
U-235+D	ΣDSR(j)		7.042E-04	6.889E-04	6.591E-04	5.647E-04	3.633E-04	7.768E-05	9.461E-07	1.879E-13
0U-235+D	U-235+D	1.376E-02	3.560E-03	3.482E-03	3.332E-03	2.854E-03	1.833E-03	3.896E-04	4.663E-06	8.739E-13
U-235+D	Pa-231	1.376E-02	6.305E-08	1.855E-07	4.143E-07	1.065E-06	1.987E-06	1.390E-06	4.964E-08	3.075E-14
U-235+D	Ac-227+D2	1.376E-02	1.821E-09	1.228E-08	5.971E-08	3.983E-07	1.527E-06	1.605E-06	6.422E-08	4.124E-14
U-235+D	ΣDSR(j)		3.560E-03	3.483E-03	3.332E-03	2.855E-03	1.837E-03	3.926E-04	4.777E-06	9.458E-13
0U-235+D	U-235+D	3.809E-05	9.854E-06	9.638E-06	9.221E-06	7.898E-06	5.074E-06	1.078E-06	1.291E-08	2.419E-15
U-235+D	Pa-231	3.809E-05	1.745E-10	5.133E-10	1.147E-09	2.947E-09	5.499E-09	3.847E-09	1.374E-10	8.510E-17
U-235+D	Ac-227+D3	3.809E-05	5.077E-12	3.424E-11	1.665E-10	1.110E-09	4.258E-09	4.474E-09	1.790E-10	1.150E-16
U-235+D	ΣDSR(j)		9.854E-06	9.639E-06	9.222E-06	7.902E-06	5.083E-06	1.086E-06	1.322E-08	2.619E-15
0U-235+D	U-235+D	8.257E-07	2.136E-07	2.090E-07	1.999E-07	1.712E-07	1.100E-07	2.337E-08	2.798E-10	5.243E-17
U-235+D	Pa-231	8.257E-07	3.783E-12	1.113E-11	2.486E-11	6.389E-11	1.192E-10	8.340E-11	2.978E-12	1.845E-18
U-235+D	Ac-227+D4	8.257E-07	8.048E-14	5.428E-13	2.639E-12	1.760E-11	6.750E-11	7.092E-11	2.838E-12	1.823E-18
U-235+D	ΣDSR(j)		2.136E-07	2.090E-07	1.999E-07	1.713E-07	1.102E-07	2.353E-08	2.856E-10	5.610E-17
0U-235+D	U-235+D	2.285E-09	5.913E-10	5.783E-10	5.533E-10	4.739E-10	3.044E-10	6.469E-11	7.744E-13	1.451E-19
U-235+D	Pa-231	2.285E-09	1.047E-14	3.080E-14	6.880E-14	1.768E-13	3.299E-13	2.308E-13	8.243E-15	5.106E-21
U-235+D	Ac-227+D5	2.285E-09	2.249E-16	1.517E-15	7.376E-15	4.920E-14	1.887E-13	1.982E-13	7.932E-15	5.095E-21
U-235+D	ΣDSR(j)		5.913E-10	5.784E-10	5.534E-10	4.741E-10	3.050E-10	6.512E-11	7.906E-13	1.553E-19
0U-238	U-238	5.450E-07	6.224E-09	6.087E-09	5.824E-09	4.988E-09	3.204E-09	6.808E-10	8.148E-12	1.528E-18
0U-238+D	U-238+D	1.599E-03	5.976E-03	5.845E-03	5.592E-03	4.789E-03	3.076E-03	6.532E-04	7.803E-06	1.445E-12
U-238+D	U-234	1.599E-03	2.878E-11	8.467E-11	1.891E-10	4.862E-10	9.073E-10	6.352E-10	2.272E-11	1.417E-17
U-238+D	Th-230	1.599E-03	1.859E-16	1.285E-15	6.602E-15	5.336E-14	3.388E-13	1.498E-12	2.267E-12	2.246E-12
U-238+D	Ra-226+D	1.599E-03	2.677E-18	3.964E-17	4.493E-16	1.073E-14	1.953E-13	2.626E-12	7.556E-12	7.802E-12
U-238+D	Pb-210+D1	1.599E-03	1.090E-21	3.320E-20	8.044E-19	5.460E-17	2.599E-15	8.335E-14	3.553E-13	3.861E-13
U-238+D	ΣDSR(j)		5.976E-03	5.845E-03	5.592E-03	4.789E-03	3.076E-03	6.532E-04	7.803E-06	1.188E-11
0U-238+D	U-238+D	2.111E-09	7.888E-09	7.716E-09	7.382E-09	6.322E-09	4.061E-09	8.623E-10	1.030E-11	1.908E-18
U-238+D	U-234	2.111E-09	3.799E-17	1.118E-16	2.497E-16	6.417E-16	1.198E-15	8.384E-16	3.000E-17	1.871E-23
U-238+D	Th-230	2.111E-09	2.454E-22	1.696E-21	8.714E-21	7.043E-20	4.472E-19	1.977E-18	2.993E-18	2.965E-18
U-238+D	Ra-226+D	2.111E-09	3.534E-24	5.232E-23	5.930E-22	1.417E-20	2.578E-19	3.467E-18	9.974E-18	1.030E-17
U-238+D	Pb-210+D2	2.111E-09	1.081E-27	3.292E-26	7.977E-25	5.414E-23	2.577E-21	8.266E-20	3.524E-19	3.829E-19
U-238+D	ΣDSR(j)		7.888E-09	7.716E-09	7.382E-09	6.322E-09	4.061E-09	8.623E-10	1.030E-11	1.555E-17

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	3.039E-11	1.135E-10	1.111E-10	1.062E-10	9.100E-11	5.845E-11	1.241E-11	1.483E-13	2.746E-20
U-238+D	U-234	3.039E-11	5.469E-19	1.609E-18	3.594E-18	9.237E-18	1.724E-17	1.207E-17	4.317E-19	2.693E-25
U-238+D	Th-230	3.039E-11	3.532E-24	2.442E-23	1.254E-22	1.014E-21	6.437E-21	2.846E-20	4.308E-20	4.267E-20
U-238+D	Ra-226+D	3.039E-11	5.086E-26	7.531E-25	8.536E-24	2.039E-22	3.710E-21	4.990E-20	1.436E-19	1.482E-19
U-238+D	Pb-210+D3	3.039E-11	1.544E-29	4.702E-28	1.139E-26	7.732E-25	3.681E-23	1.180E-21	5.032E-21	5.468E-21
U-238+D	ΣDSR(j)		1.135E-10	1.111E-10	1.062E-10	9.100E-11	5.845E-11	1.241E-11	1.483E-13	2.239E-19
0U-238+D	U-238+D	3.359E-07	1.255E-06	1.228E-06	1.175E-06	1.006E-06	6.461E-07	1.372E-07	1.639E-09	3.036E-16
U-238+D	U-234	3.359E-07	6.046E-15	1.778E-14	3.973E-14	1.021E-13	1.906E-13	1.334E-13	4.773E-15	2.977E-21
U-238+D	Th-230	3.359E-07	3.905E-20	2.699E-19	1.387E-18	1.121E-17	7.117E-17	3.147E-16	4.762E-16	4.718E-16
U-238+D	Ra-226+D1	3.359E-07	5.622E-22	8.326E-21	9.436E-20	2.254E-18	4.102E-17	5.517E-16	1.587E-15	1.639E-15
U-238+D	Pb-210+D1	3.359E-07	2.290E-25	6.973E-24	1.690E-22	1.147E-20	5.459E-19	1.751E-17	7.463E-17	8.109E-17
U-238+D	ΣDSR(j)		1.255E-06	1.228E-06	1.175E-06	1.006E-06	6.461E-07	1.372E-07	1.639E-09	2.495E-15
0U-238+D	U-238+D	4.434E-13	1.657E-12	1.621E-12	1.550E-12	1.328E-12	8.529E-13	1.811E-13	2.163E-15	4.008E-22
U-238+D	U-234	4.434E-13	7.980E-21	2.348E-20	5.244E-20	1.348E-19	2.515E-19	1.761E-19	6.300E-21	3.930E-27
U-238+D	Th-230	4.434E-13	5.155E-26	3.563E-25	1.830E-24	1.479E-23	9.394E-23	4.153E-22	6.286E-22	6.227E-22
U-238+D	Ra-226+D1	4.434E-13	7.422E-28	1.099E-26	1.246E-25	2.975E-24	5.414E-23	7.282E-22	2.095E-21	2.163E-21
U-238+D	Pb-210+D2	4.434E-13	2.271E-31	6.915E-30	1.676E-28	1.137E-26	5.414E-25	1.736E-23	7.402E-23	8.042E-23
U-238+D	ΣDSR(j)		1.657E-12	1.621E-12	1.550E-12	1.328E-12	8.529E-13	1.811E-13	2.163E-15	3.267E-21
0U-238+D	U-238+D	6.383E-15	2.385E-14	2.333E-14	2.232E-14	1.911E-14	1.228E-14	2.607E-15	3.114E-17	5.769E-24
U-238+D	U-234	6.383E-15	1.149E-22	3.379E-22	7.548E-22	1.940E-21	3.621E-21	2.535E-21	9.069E-23	5.657E-29
U-238+D	Th-230	6.383E-15	7.420E-28	5.129E-27	2.635E-26	2.129E-25	1.352E-24	5.978E-24	9.048E-24	8.963E-24
U-238+D	Ra-226+D1	6.383E-15	1.068E-29	1.582E-28	1.793E-27	4.283E-26	7.793E-25	1.048E-23	3.015E-23	3.114E-23
U-238+D	Pb-210+D3	6.383E-15	3.243E-33	9.876E-32	2.393E-30	1.624E-28	7.732E-27	2.479E-25	1.057E-24	1.148E-24
U-238+D	ΣDSR(j)		2.385E-14	2.333E-14	2.232E-14	1.911E-14	1.228E-14	2.607E-15	3.114E-17	4.702E-23
0U-238+D	U-238+D	3.196E-07	1.194E-06	1.168E-06	1.118E-06	9.571E-07	6.148E-07	1.305E-07	1.559E-09	2.889E-16
U-238+D	U-234	3.196E-07	5.752E-15	1.692E-14	3.780E-14	9.716E-14	1.813E-13	1.269E-13	4.541E-15	2.833E-21
U-238+D	Th-230	3.196E-07	3.715E-20	2.568E-19	1.319E-18	1.066E-17	6.771E-17	2.994E-16	4.531E-16	4.488E-16
U-238+D	Ra-226+D2	3.196E-07	4.702E-22	6.963E-21	7.892E-20	1.885E-18	3.430E-17	4.613E-16	1.327E-15	1.367E-15
U-238+D	Pb-210+D1	3.196E-07	2.178E-25	6.634E-24	1.608E-22	1.091E-20	5.194E-19	1.666E-17	7.101E-17	7.715E-17
U-238+D	ΣDSR(j)		1.194E-06	1.168E-06	1.118E-06	9.571E-07	6.148E-07	1.305E-07	1.559E-09	2.182E-15
0U-238+D	U-238+D	4.219E-13	1.576E-12	1.542E-12	1.475E-12	1.263E-12	8.115E-13	1.723E-13	2.058E-15	3.813E-22
U-238+D	U-234	4.219E-13	7.593E-21	2.233E-20	4.989E-20	1.282E-19	2.393E-19	1.675E-19	5.994E-21	3.739E-27
U-238+D	Th-230	4.219E-13	4.904E-26	3.390E-25	1.742E-24	1.408E-23	8.938E-23	3.952E-22	5.980E-22	5.925E-22
U-238+D	Ra-226+D2	4.219E-13	6.207E-28	9.192E-27	1.042E-25	2.488E-24	4.528E-23	6.089E-22	1.751E-21	1.805E-21
U-238+D	Pb-210+D2	4.219E-13	2.160E-31	6.579E-30	1.594E-28	1.082E-26	5.151E-25	1.652E-23	7.042E-23	7.651E-23
U-238+D	ΣDSR(j)		1.576E-12	1.542E-12	1.475E-12	1.263E-12	8.115E-13	1.723E-13	2.058E-15	2.855E-21

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 32
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.073E-15	2.269E-14	2.219E-14	2.123E-14	1.819E-14	1.168E-14	2.480E-15	2.963E-17	5.488E-24
U-238+D	U-234	6.073E-15	1.093E-22	3.215E-22	7.182E-22	1.846E-21	3.445E-21	2.412E-21	8.628E-23	5.382E-29
U-238+D	Th-230	6.073E-15	7.059E-28	4.880E-27	2.507E-26	2.026E-25	1.286E-24	5.688E-24	8.608E-24	8.528E-24
U-238+D	Ra-226+D2	6.073E-15	8.935E-30	1.323E-28	1.499E-27	3.582E-26	6.517E-25	8.765E-24	2.520E-23	2.598E-23
U-238+D	Pb-210+D3	6.073E-15	3.085E-33	9.396E-32	2.277E-30	1.545E-28	7.356E-27	2.359E-25	1.006E-24	1.093E-24
U-238+D	ΣDSR(j)		2.269E-14	2.219E-14	2.123E-14	1.819E-14	1.168E-14	2.480E-15	2.963E-17	4.109E-23
0U-238+D	U-238+D	6.713E-11	2.508E-10	2.454E-10	2.347E-10	2.010E-10	1.291E-10	2.742E-11	3.275E-13	6.067E-20
U-238+D	U-234	6.713E-11	1.208E-18	3.554E-18	7.939E-18	2.041E-17	3.808E-17	2.666E-17	9.538E-19	5.950E-25
U-238+D	Th-230	6.713E-11	7.804E-24	5.394E-23	2.771E-22	2.240E-21	1.422E-20	6.288E-20	9.516E-20	9.428E-20
U-238+D	Ra-226+D3	6.713E-11	9.877E-26	1.463E-24	1.658E-23	3.960E-22	7.205E-21	9.689E-20	2.786E-19	2.872E-19
U-238+D	Pb-210+D1	6.713E-11	4.576E-29	1.394E-27	3.377E-26	2.292E-24	1.091E-22	3.499E-21	1.492E-20	1.620E-20
U-238+D	ΣDSR(j)		2.508E-10	2.454E-10	2.347E-10	2.010E-10	1.291E-10	2.742E-11	3.275E-13	4.584E-19
0U-238+D	U-238+D	8.862E-17	3.311E-16	3.239E-16	3.098E-16	2.654E-16	1.704E-16	3.619E-17	4.323E-19	8.009E-26
U-238+D	U-234	8.862E-17	1.595E-24	4.691E-24	1.048E-23	2.694E-23	5.027E-23	3.519E-23	1.259E-24	7.854E-31
U-238+D	Th-230	8.862E-17	1.030E-29	7.120E-29	3.658E-28	2.956E-27	1.877E-26	8.300E-26	1.256E-25	1.244E-25
U-238+D	Ra-226+D3	8.862E-17	1.304E-31	1.931E-30	2.188E-29	5.227E-28	9.510E-27	1.279E-25	3.678E-25	3.791E-25
U-238+D	Pb-210+D2	8.862E-17	4.538E-35	1.382E-33	3.348E-32	2.273E-30	1.082E-28	3.470E-27	1.479E-26	1.607E-26
U-238+D	ΣDSR(j)		3.311E-16	3.239E-16	3.098E-16	2.654E-16	1.704E-16	3.619E-17	4.323E-19	5.997E-25
0U-238+D	U-238+D	1.276E-18	4.766E-18	4.662E-18	4.460E-18	3.820E-18	2.453E-18	5.210E-19	6.223E-21	1.153E-27
U-238+D	U-234	1.276E-18	2.296E-26	6.753E-26	1.508E-25	3.877E-25	7.236E-25	5.066E-25	1.812E-26	1.130E-32
U-238+D	Th-230	1.276E-18	1.483E-31	1.025E-30	5.265E-30	4.255E-29	2.702E-28	1.195E-27	1.808E-27	1.791E-27
U-238+D	Ra-226+D3	1.276E-18	1.877E-33	2.779E-32	3.149E-31	7.523E-30	1.369E-28	1.841E-27	5.294E-27	5.457E-27
U-238+D	Pb-210+D3	1.276E-18	6.480E-37	1.974E-35	4.782E-34	3.246E-32	1.545E-30	4.955E-29	2.112E-28	2.295E-28
U-238+D	ΣDSR(j)		4.766E-18	4.662E-18	4.460E-18	3.820E-18	2.453E-18	5.210E-19	6.223E-21	8.630E-27
0U-238+D	U-238+D	3.200E-10	1.196E-09	1.170E-09	1.119E-09	9.583E-10	6.155E-10	1.307E-10	1.561E-12	2.892E-19
U-238+D	U-234	3.200E-10	5.759E-18	1.694E-17	3.784E-17	9.727E-17	1.815E-16	1.271E-16	4.547E-18	2.836E-24
U-238+D	Th-230	3.200E-10	3.720E-23	2.571E-22	1.321E-21	1.068E-20	6.779E-20	2.997E-19	4.536E-19	4.494E-19
U-238+D	Ra-226+D4	3.200E-10	8.526E-27	1.262E-25	1.431E-24	3.418E-23	6.222E-22	8.377E-21	2.418E-20	2.539E-20
U-238+D	Pb-210+D1	3.200E-10	2.181E-28	6.642E-27	1.609E-25	1.092E-23	5.200E-22	1.668E-20	7.109E-20	7.724E-20
U-238+D	ΣDSR(j)		1.196E-09	1.170E-09	1.119E-09	9.583E-10	6.155E-10	1.307E-10	1.561E-12	8.412E-19
0U-238+D	U-238+D	4.224E-16	1.578E-15	1.544E-15	1.477E-15	1.265E-15	8.125E-16	1.725E-16	2.061E-18	3.818E-25
U-238+D	U-234	4.224E-16	7.602E-24	2.236E-23	4.995E-23	1.284E-22	2.396E-22	1.678E-22	6.001E-24	3.744E-30
U-238+D	Th-230	4.224E-16	4.910E-29	3.394E-28	1.744E-27	1.409E-26	8.948E-26	3.956E-25	5.988E-25	5.932E-25
U-238+D	Ra-226+D4	4.224E-16	1.125E-32	1.666E-31	1.889E-30	4.512E-29	8.213E-28	1.106E-26	3.191E-26	3.352E-26
U-238+D	Pb-210+D2	4.224E-16	2.163E-34	6.587E-33	1.596E-31	1.083E-29	5.157E-28	1.654E-26	7.051E-26	7.660E-26
U-238+D	ΣDSR(j)		1.578E-15	1.544E-15	1.477E-15	1.265E-15	8.125E-16	1.725E-16	2.061E-18	1.085E-24

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 33
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.080E-18	2.272E-17	2.222E-17	2.126E-17	1.821E-17	1.169E-17	2.483E-18	2.966E-20	5.495E-27
U-238+D	U-234	6.080E-18	1.094E-25	3.219E-25	7.190E-25	1.848E-24	3.449E-24	2.415E-24	8.638E-26	5.389E-32
U-238+D	Th-230	6.080E-18	7.068E-31	4.885E-30	2.510E-29	2.028E-28	1.288E-27	5.695E-27	8.619E-27	8.538E-27
U-238+D	Ra-226+D4	6.080E-18	1.620E-34	2.399E-33	2.719E-32	6.495E-31	1.182E-29	1.592E-28	4.594E-28	4.825E-28
U-238+D	Pb-210+D3	6.080E-18	3.089E-36	9.407E-35	2.279E-33	1.547E-31	7.365E-30	2.362E-28	1.007E-27	1.094E-27
U-238+D	ΣDSR(j)		2.272E-17	2.222E-17	2.126E-17	1.821E-17	1.169E-17	2.483E-18	2.966E-20	1.561E-26
0U-238+D1	U-238+D1	9.980E-01	4.832E-02	4.727E-02	4.522E-02	3.873E-02	2.488E-02	5.285E-03	6.319E-05	1.178E-11
U-238+D1	U-234	9.980E-01	1.796E-08	5.283E-08	1.180E-07	3.034E-07	5.661E-07	3.963E-07	1.418E-08	8.845E-15
U-238+D1	Th-230	9.980E-01	1.160E-13	8.019E-13	4.120E-12	3.330E-11	2.114E-10	9.348E-10	1.415E-09	1.402E-09
U-238+D1	Ra-226+D	9.980E-01	1.670E-15	2.473E-14	2.803E-13	6.697E-12	1.219E-10	1.639E-09	4.715E-09	4.869E-09
U-238+D1	Pb-210+D1	9.980E-01	6.802E-19	2.072E-17	5.020E-16	3.407E-14	1.622E-12	5.201E-11	2.217E-10	2.409E-10
U-238+D1	ΣDSR(j)		4.832E-02	4.727E-02	4.522E-02	3.873E-02	2.488E-02	5.285E-03	6.321E-05	6.523E-09
0U-238+D1	U-238+D1	1.317E-06	6.379E-08	6.239E-08	5.969E-08	5.112E-08	3.284E-08	6.976E-09	8.341E-11	1.555E-17
U-238+D1	U-234	1.317E-06	2.371E-14	6.974E-14	1.558E-13	4.004E-13	7.473E-13	5.232E-13	1.872E-14	1.168E-20
U-238+D1	Th-230	1.317E-06	1.531E-19	1.059E-18	5.438E-18	4.395E-17	2.791E-16	1.234E-15	1.867E-15	1.850E-15
U-238+D1	Ra-226+D	1.317E-06	2.205E-21	3.265E-20	3.700E-19	8.840E-18	1.608E-16	2.163E-15	6.224E-15	6.427E-15
U-238+D1	Pb-210+D2	1.317E-06	6.746E-25	2.054E-23	4.978E-22	3.379E-20	1.608E-18	5.158E-17	2.199E-16	2.389E-16
U-238+D1	ΣDSR(j)		6.379E-08	6.239E-08	5.969E-08	5.113E-08	3.284E-08	6.976E-09	8.344E-11	8.531E-15
0U-238+D1	U-238+D1	1.896E-08	9.182E-10	8.981E-10	8.592E-10	7.359E-10	4.727E-10	1.004E-10	1.201E-12	2.238E-19
U-238+D1	U-234	1.896E-08	3.413E-16	1.004E-15	2.242E-15	5.764E-15	1.076E-14	7.531E-15	2.694E-16	1.681E-22
U-238+D1	Th-230	1.896E-08	2.204E-21	1.524E-20	7.827E-20	6.326E-19	4.017E-18	1.776E-17	2.688E-17	2.663E-17
U-238+D1	Ra-226+D	1.896E-08	3.174E-23	4.700E-22	5.326E-21	1.272E-19	2.315E-18	3.114E-17	8.958E-17	9.251E-17
U-238+D1	Pb-210+D3	1.896E-08	9.633E-27	2.934E-25	7.109E-24	4.825E-22	2.297E-20	7.366E-19	3.140E-18	3.412E-18
U-238+D1	ΣDSR(j)		9.182E-10	8.981E-10	8.592E-10	7.359E-10	4.727E-10	1.004E-10	1.201E-12	1.228E-16
0U-238+D1	U-238+D1	2.096E-04	1.015E-05	9.928E-06	9.498E-06	8.135E-06	5.226E-06	1.110E-06	1.327E-08	2.474E-15
U-238+D1	U-234	2.096E-04	3.773E-12	1.110E-11	2.479E-11	6.372E-11	1.189E-10	8.325E-11	2.978E-12	1.858E-18
U-238+D1	Th-230	2.096E-04	2.437E-17	1.684E-16	8.653E-16	6.994E-15	4.441E-14	1.963E-13	2.971E-13	2.944E-13
U-238+D1	Ra-226+D1	2.096E-04	3.508E-19	5.195E-18	5.888E-17	1.407E-15	2.559E-14	3.442E-13	9.903E-13	1.023E-12
U-238+D1	Pb-210+D1	2.096E-04	1.429E-22	4.351E-21	1.054E-19	7.156E-18	3.407E-16	1.092E-14	4.657E-14	5.060E-14
U-238+D1	ΣDSR(j)		1.015E-05	9.928E-06	9.498E-06	8.135E-06	5.226E-06	1.110E-06	1.328E-08	1.370E-12
0U-238+D1	U-238+D1	2.767E-10	1.340E-11	1.311E-11	1.254E-11	1.074E-11	6.898E-12	1.465E-12	1.752E-14	3.265E-21
U-238+D1	U-234	2.767E-10	4.980E-18	1.465E-17	3.272E-17	8.411E-17	1.570E-16	1.099E-16	3.931E-18	2.452E-24
U-238+D1	Th-230	2.767E-10	3.217E-23	2.223E-22	1.142E-21	9.231E-21	5.862E-20	2.592E-19	3.922E-19	3.886E-19
U-238+D1	Ra-226+D1	2.767E-10	4.631E-25	6.858E-24	7.772E-23	1.857E-21	3.378E-20	4.544E-19	1.307E-18	1.350E-18
U-238+D1	Pb-210+D2	2.767E-10	1.417E-28	4.315E-27	1.046E-25	7.097E-24	3.378E-22	1.083E-20	4.619E-20	5.018E-20
U-238+D1	ΣDSR(j)		1.340E-11	1.311E-11	1.254E-11	1.074E-11	6.898E-12	1.465E-12	1.753E-14	1.792E-18

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	3.983E-12	1.929E-13	1.886E-13	1.805E-13	1.546E-13	9.929E-14	2.109E-14	2.522E-16	4.700E-23
U-238+D1	U-234	3.983E-12	7.168E-20	2.108E-19	4.710E-19	1.211E-18	2.259E-18	1.582E-18	5.659E-20	3.530E-26
U-238+D1	Th-230	3.983E-12	4.630E-25	3.200E-24	1.644E-23	1.329E-22	8.437E-22	3.731E-21	5.646E-21	5.593E-21
U-238+D1	Ra-226+D1	3.983E-12	6.666E-27	9.871E-26	1.119E-24	2.672E-23	4.863E-22	6.540E-21	1.882E-20	1.943E-20
U-238+D1	Pb-210+D3	3.983E-12	2.023E-30	6.162E-29	1.493E-27	1.013E-25	4.824E-24	1.547E-22	6.596E-22	7.166E-22
U-238+D1	ΣDSR(j)		1.929E-13	1.886E-13	1.805E-13	1.546E-13	9.929E-14	2.109E-14	2.523E-16	2.579E-20
0U-238+D1	U-238+D1	1.994E-04	9.657E-06	9.446E-06	9.037E-06	7.740E-06	4.972E-06	1.056E-06	1.263E-08	2.353E-15
U-238+D1	U-234	1.994E-04	3.589E-12	1.056E-11	2.359E-11	6.062E-11	1.131E-10	7.921E-11	2.834E-12	1.768E-18
U-238+D1	Th-230	1.994E-04	2.318E-17	1.603E-16	8.233E-16	6.654E-15	4.225E-14	1.868E-13	2.827E-13	2.801E-13
U-238+D1	Ra-226+D2	1.994E-04	2.934E-19	4.345E-18	4.925E-17	1.176E-15	2.140E-14	2.879E-13	8.278E-13	8.533E-13
U-238+D1	Pb-210+D1	1.994E-04	1.359E-22	4.140E-21	1.003E-19	6.808E-18	3.241E-16	1.039E-14	4.431E-14	4.814E-14
U-238+D1	ΣDSR(j)		9.657E-06	9.446E-06	9.037E-06	7.740E-06	4.972E-06	1.056E-06	1.263E-08	1.184E-12
0U-238+D1	U-238+D1	2.633E-10	1.275E-11	1.247E-11	1.193E-11	1.022E-11	6.563E-12	1.394E-12	1.667E-14	3.107E-21
U-238+D1	U-234	2.633E-10	4.738E-18	1.394E-17	3.113E-17	8.003E-17	1.493E-16	1.046E-16	3.740E-18	2.333E-24
U-238+D1	Th-230	2.633E-10	3.060E-23	2.115E-22	1.087E-21	8.783E-21	5.577E-20	2.466E-19	3.732E-19	3.697E-19
U-238+D1	Ra-226+D2	2.633E-10	3.873E-25	5.736E-24	6.500E-23	1.553E-21	2.825E-20	3.800E-19	1.093E-18	1.126E-18
U-238+D1	Pb-210+D2	2.633E-10	1.348E-28	4.105E-27	9.948E-26	6.752E-24	3.214E-22	1.031E-20	4.394E-20	4.774E-20
U-238+D1	ΣDSR(j)		1.275E-11	1.247E-11	1.193E-11	1.022E-11	6.563E-12	1.394E-12	1.667E-14	1.547E-18
0U-238+D1	U-238+D1	3.789E-12	1.835E-13	1.795E-13	1.717E-13	1.471E-13	9.446E-14	2.007E-14	2.399E-16	4.472E-23
U-238+D1	U-234	3.789E-12	6.820E-20	2.006E-19	4.481E-19	1.152E-18	2.150E-18	1.505E-18	5.384E-20	3.358E-26
U-238+D1	Th-230	3.789E-12	4.405E-25	3.045E-24	1.564E-23	1.264E-22	8.028E-22	3.549E-21	5.372E-21	5.322E-21
U-238+D1	Ra-226+D2	3.789E-12	5.575E-27	8.256E-26	9.357E-25	2.235E-23	4.067E-22	5.469E-21	1.573E-20	1.621E-20
U-238+D1	Pb-210+D3	3.789E-12	1.925E-30	5.863E-29	1.421E-27	9.642E-26	4.590E-24	1.472E-22	6.275E-22	6.818E-22
U-238+D1	ΣDSR(j)		1.835E-13	1.795E-13	1.717E-13	1.471E-13	9.447E-14	2.007E-14	2.400E-16	2.226E-20
0U-238+D1	U-238+D1	4.189E-08	2.028E-09	1.984E-09	1.898E-09	1.626E-09	1.044E-09	2.218E-10	2.652E-12	4.943E-19
U-238+D1	U-234	4.189E-08	7.539E-16	2.218E-15	4.954E-15	1.273E-14	2.376E-14	1.664E-14	5.952E-16	3.713E-22
U-238+D1	Th-230	4.189E-08	4.870E-21	3.366E-20	1.729E-19	1.398E-18	8.874E-18	3.924E-17	5.938E-17	5.883E-17
U-238+D1	Ra-226+D3	4.189E-08	6.163E-23	9.126E-22	1.034E-20	2.471E-19	4.496E-18	6.046E-17	1.739E-16	1.792E-16
U-238+D1	Pb-210+D1	4.189E-08	2.855E-26	8.695E-25	2.107E-23	1.430E-21	6.808E-20	2.183E-18	9.307E-18	1.011E-17
U-238+D1	ΣDSR(j)		2.028E-09	1.984E-09	1.898E-09	1.626E-09	1.044E-09	2.218E-10	2.653E-12	2.486E-16
0U-238+D1	U-238+D1	5.530E-14	2.678E-15	2.619E-15	2.506E-15	2.146E-15	1.378E-15	2.928E-16	3.501E-18	6.525E-25
U-238+D1	U-234	5.530E-14	9.952E-22	2.927E-21	6.539E-21	1.681E-20	3.137E-20	2.196E-20	7.856E-22	4.901E-28
U-238+D1	Th-230	5.530E-14	6.428E-27	4.443E-26	2.283E-25	1.845E-24	1.171E-23	5.179E-23	7.838E-23	7.765E-23
U-238+D1	Ra-226+D3	5.530E-14	8.135E-29	1.205E-27	1.365E-26	3.261E-25	5.934E-24	7.981E-23	2.295E-22	2.366E-22
U-238+D1	Pb-210+D2	5.530E-14	2.831E-32	8.623E-31	2.089E-29	1.418E-27	6.751E-26	2.165E-24	9.230E-24	1.003E-23
U-238+D1	ΣDSR(j)		2.678E-15	2.619E-15	2.506E-15	2.146E-15	1.379E-15	2.928E-16	3.502E-18	3.249E-22

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	7.959E-16	3.854E-17	3.770E-17	3.606E-17	3.089E-17	1.984E-17	4.215E-18	5.040E-20	9.392E-27
U-238+D1	U-234	7.959E-16	1.432E-23	4.214E-23	9.413E-23	2.419E-22	4.515E-22	3.161E-22	1.131E-23	7.054E-30
U-238+D1	Th-230	7.959E-16	9.252E-29	6.395E-28	3.285E-27	2.655E-26	1.686E-25	7.455E-25	1.128E-24	1.118E-24
U-238+D1	Ra-226+D3	7.959E-16	1.171E-30	1.734E-29	1.965E-28	4.694E-27	8.542E-26	1.149E-24	3.303E-24	3.405E-24
U-238+D1	Pb-210+D3	7.959E-16	4.044E-34	1.231E-32	2.984E-31	2.025E-29	9.641E-28	3.092E-26	1.318E-25	1.432E-25
U-238+D1	ΣDSR(j)		3.854E-17	3.770E-17	3.606E-17	3.089E-17	1.984E-17	4.215E-18	5.041E-20	4.675E-24
0U-238+D1	U-238+D1	1.997E-07	9.669E-09	9.457E-09	9.048E-09	7.749E-09	4.978E-09	1.057E-09	1.264E-11	2.356E-18
U-238+D1	U-234	1.997E-07	3.594E-15	1.057E-14	2.361E-14	6.070E-14	1.133E-13	7.930E-14	2.837E-15	1.770E-21
U-238+D1	Th-230	1.997E-07	2.321E-20	1.604E-19	8.243E-19	6.662E-18	4.230E-17	1.870E-16	2.831E-16	2.804E-16
U-238+D1	Ra-226+D4	1.997E-07	5.320E-24	7.878E-23	8.929E-22	2.133E-20	3.883E-19	5.227E-18	1.509E-17	1.585E-17
U-238+D1	Pb-210+D1	1.997E-07	1.361E-25	4.145E-24	1.004E-22	6.817E-21	3.245E-19	1.041E-17	4.436E-17	4.820E-17
U-238+D1	ΣDSR(j)		9.669E-09	9.457E-09	9.048E-09	7.749E-09	4.978E-09	1.057E-09	1.265E-11	3.468E-16
0U-238+D1	U-238+D1	2.636E-13	1.276E-14	1.248E-14	1.194E-14	1.023E-14	6.571E-15	1.396E-15	1.669E-17	3.110E-24
U-238+D1	U-234	2.636E-13	4.744E-21	1.395E-20	3.117E-20	8.012E-20	1.495E-19	1.047E-19	3.745E-21	2.336E-27
U-238+D1	Th-230	2.636E-13	3.064E-26	2.118E-25	1.088E-24	8.794E-24	5.584E-23	2.469E-22	3.736E-22	3.702E-22
U-238+D1	Ra-226+D4	2.636E-13	7.023E-30	1.040E-28	1.179E-27	2.816E-26	5.125E-25	6.900E-24	1.991E-23	2.092E-23
U-238+D1	Pb-210+D2	2.636E-13	1.350E-31	4.110E-30	9.960E-29	6.760E-27	3.218E-25	1.032E-23	4.400E-23	4.780E-23
U-238+D1	ΣDSR(j)		1.276E-14	1.248E-14	1.194E-14	1.023E-14	6.571E-15	1.396E-15	1.669E-17	4.420E-22
0U-238+D1	U-238+D1	3.794E-15	1.837E-16	1.797E-16	1.719E-16	1.472E-16	9.458E-17	2.009E-17	2.402E-19	4.477E-26
U-238+D1	U-234	3.794E-15	6.828E-23	2.008E-22	4.487E-22	1.153E-21	2.152E-21	1.507E-21	5.390E-23	3.363E-29
U-238+D1	Th-230	3.794E-15	4.410E-28	3.049E-27	1.566E-26	1.266E-25	8.037E-25	3.554E-24	5.378E-24	5.328E-24
U-238+D1	Ra-226+D4	3.794E-15	1.011E-31	1.497E-30	1.696E-29	4.053E-28	7.377E-27	9.932E-26	2.866E-25	3.011E-25
U-238+D1	Pb-210+D3	3.794E-15	1.927E-33	5.870E-32	1.422E-30	9.654E-29	4.596E-27	1.474E-25	6.283E-25	6.826E-25
U-238+D1	ΣDSR(j)		1.837E-16	1.797E-16	1.719E-16	1.472E-16	9.458E-17	2.009E-17	2.403E-19	6.356E-24

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

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Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

0Nuclide

(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.971E+01	2.150E+01	2.558E+01	4.696E+01	2.665E+02	1.161E+05	4.022E+12	*7.232E+13
Pa-231	5.495E+01	5.173E+01	4.728E+01	4.147E+01	4.909E+01	2.124E+02	1.780E+04	*4.723E+10
Pb-210	1.078E+02	1.124E+02	1.224E+02	1.646E+02	3.835E+02	7.414E+03	3.508E+07	*7.632E+13
Ra-226	6.965E+00	7.065E+00	7.271E+00	8.053E+00	1.089E+01	3.307E+01	8.524E+02	7.589E+07
Ra-228	1.068E+01	8.895E+00	8.392E+00	1.567E+01	2.237E+02	3.131E+06	*2.726E+14	*2.726E+14
Th-228	9.204E+00	1.323E+01	2.732E+01	3.459E+02	4.884E+05	*8.201E+14	*8.201E+14	*8.201E+14
Th-230	8.947E+02	8.479E+02	7.691E+02	5.895E+02	3.810E+02	2.324E+02	1.984E+02	2.037E+02
Th-232	9.317E+01	4.293E+01	1.930E+01	7.663E+00	5.394E+00	5.295E+00	5.336E+00	5.516E+00
U-234	1.954E+03	1.997E+03	2.088E+03	2.437E+03	3.789E+03	1.745E+04	3.654E+05	4.896E+05
U-235	9.663E+01	9.878E+01	1.032E+02	1.205E+02	1.873E+02	8.761E+02	7.193E+04	*2.160E+06
U-238	4.602E+02	4.705E+02	4.918E+02	5.742E+02	8.939E+02	4.208E+03	*3.361E+05	*3.361E+05

*At specific activity limit

0
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 331.2 ± 0.7 years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	7.000E-03	0.000E+00	1.268E+00	1.971E+01	4.131E-13	6.052E+13
Pa-231	1.400E-02	12.65 ± 0.03	6.074E-01	4.116E+01	7.030E-04	3.556E+04
Pb-210	8.000E-03	0.000E+00	0.000E+00	*7.632E+13	1.901E-07	1.315E+08
Pb-210	8.000E-03	0.000E+00	2.319E-01	1.078E+02	1.901E-07	1.315E+08
Ra-226	7.000E-03	0.000E+00	3.589E+00	6.965E+00	1.764E-02	1.417E+03
Ra-228	3.600E-04	2.421 ± 0.005	3.002E+00	8.329E+00	1.604E-19	*2.726E+14
Th-228	1.000E-03	0.000E+00	2.716E+00	9.204E+00	0.000E+00	*8.201E+14
Th-230	1.000E+00	353.5 ± 0.7	1.262E-01	1.981E+02	1.262E-01	1.981E+02
Th-232	1.000E-03	62.2 ± 0.1	4.727E+00	5.289E+00	4.680E+00	5.342E+00
U-234	1.200E-02	0.000E+00	1.280E-02	1.954E+03	6.041E-05	4.138E+05
U-235	5.200E-04	0.000E+00	2.587E-01	9.663E+01	1.746E-04	1.432E+05
U-238	1.200E-02	0.000E+00	5.432E-02	4.602E+02	3.559E-05	*3.361E+05

*At specific activity limit

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	8.740E-03	8.013E-03	6.736E-03	3.669E-03	6.465E-04	1.485E-06	4.284E-14	0.000E+00
Ac-227	Ac-227	2.722E-03	2.435E-05	2.233E-05	1.877E-05	1.022E-05	1.801E-06	4.137E-09	1.194E-16	0.000E+00
Ac-227	Pa-231	9.835E-01	2.802E-04	8.011E-04	1.682E-03	3.509E-03	3.936E-03	9.687E-04	1.156E-05	2.132E-12
Ac-227	U-235	9.835E-01	7.365E-11	4.968E-10	2.415E-09	1.611E-08	6.177E-08	6.491E-08	2.597E-09	1.668E-15
Ac-227	ΣDOSE(j)		9.044E-03	8.837E-03	8.437E-03	7.188E-03	4.585E-03	9.703E-04	1.156E-05	2.134E-12
0Ac-227	Ac-227	1.376E-02	1.124E-04	1.030E-04	8.660E-05	4.717E-05	8.311E-06	1.909E-08	5.508E-16	0.000E+00
Ac-227	Ac-227	3.809E-05	3.133E-07	2.872E-07	2.414E-07	1.315E-07	2.317E-08	5.322E-11	1.536E-18	0.000E+00
Ac-227	Pa-231	1.376E-02	3.602E-06	1.030E-05	2.163E-05	4.511E-05	5.061E-05	1.245E-05	1.486E-07	2.742E-14
Ac-227	U-235	1.376E-02	9.469E-13	6.387E-12	3.105E-11	2.071E-10	7.942E-10	8.345E-10	3.339E-11	2.145E-17
Ac-227	ΣDOSE(j)		1.163E-04	1.136E-04	1.085E-04	9.241E-05	5.894E-05	1.247E-05	1.487E-07	2.744E-14
0Ac-227	Ac-227	8.257E-07	4.966E-09	4.553E-09	3.827E-09	2.084E-09	3.673E-10	8.435E-13	2.434E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.388E-11	1.273E-11	1.070E-11	5.827E-12	1.027E-12	2.358E-15	6.803E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	1.592E-10	4.552E-10	9.558E-10	1.993E-09	2.236E-09	5.504E-10	6.568E-12	1.212E-18
Ac-227	U-235	8.257E-07	4.185E-17	2.822E-16	1.372E-15	9.153E-15	3.510E-14	3.688E-14	1.476E-15	9.479E-22
Ac-227	ΣDOSE(j)		5.139E-09	5.021E-09	4.794E-09	4.084E-09	2.605E-09	5.513E-10	6.570E-12	1.213E-18
0Pa-231	Pa-231	9.835E-01	5.985E-03	5.854E-03	5.600E-03	4.796E-03	3.080E-03	6.534E-04	7.786E-06	1.438E-12
Pa-231	Pa-231	2.722E-03	1.656E-05	1.620E-05	1.550E-05	1.327E-05	8.523E-06	1.808E-06	2.155E-08	3.980E-15
Pa-231	U-235	9.835E-01	2.343E-09	6.892E-09	1.540E-08	3.957E-08	7.383E-08	5.166E-08	1.845E-09	1.143E-15
Pa-231	U-235	2.722E-03	6.485E-12	1.908E-11	4.261E-11	1.095E-10	2.043E-10	1.430E-10	5.105E-12	3.163E-18
Pa-231	U-235	1.376E-02	3.278E-11	9.644E-11	2.154E-10	5.537E-10	1.033E-09	7.228E-10	2.581E-11	1.599E-17
Pa-231	U-235	3.809E-05	9.073E-14	2.669E-13	5.962E-13	1.532E-12	2.859E-12	2.000E-12	7.143E-14	4.425E-20
Pa-231	U-235	8.257E-07	1.967E-15	5.787E-15	1.293E-14	3.322E-14	6.199E-14	4.337E-14	1.549E-15	9.594E-22
Pa-231	U-235	2.285E-09	5.444E-18	1.602E-17	3.578E-17	9.195E-17	1.716E-16	1.200E-16	4.286E-18	2.655E-24
Pa-231	ΣDOSE(j)		6.001E-03	5.870E-03	5.616E-03	4.809E-03	3.088E-03	6.552E-04	7.810E-06	1.443E-12
0Ac-227	Pa-231	2.722E-03	7.807E-07	2.232E-06	4.687E-06	9.776E-06	1.097E-05	2.699E-06	3.221E-08	5.939E-15
Ac-227	U-235	2.722E-03	2.052E-13	1.384E-12	6.729E-12	4.489E-11	1.721E-10	1.809E-10	7.237E-12	4.646E-18
Ac-227	ΣDOSE(j)		7.807E-07	2.232E-06	4.687E-06	9.776E-06	1.097E-05	2.699E-06	3.222E-08	5.944E-15
0Pa-231	Pa-231	1.376E-02	8.374E-05	8.191E-05	7.836E-05	6.710E-05	4.309E-05	9.142E-06	1.089E-07	2.012E-14
Pa-231	Pa-231	3.809E-05	2.318E-07	2.267E-07	2.169E-07	1.857E-07	1.193E-07	2.530E-08	3.015E-10	5.569E-17
Pa-231	ΣDOSE(j)		8.397E-05	8.213E-05	7.858E-05	6.729E-05	4.321E-05	9.167E-06	1.092E-07	2.018E-14
0Ac-227	Pa-231	3.809E-05	1.004E-08	2.872E-08	6.029E-08	1.258E-07	1.411E-07	3.472E-08	4.144E-10	7.642E-17
Ac-227	U-235	3.809E-05	2.640E-15	1.781E-14	8.656E-14	5.774E-13	2.214E-12	2.327E-12	9.310E-14	5.978E-20
Ac-227	ΣDOSE(j)		1.004E-08	2.872E-08	6.029E-08	1.258E-07	1.411E-07	3.472E-08	4.145E-10	7.648E-17
0Pa-231	Pa-231	8.257E-07	5.025E-09	4.915E-09	4.702E-09	4.027E-09	2.586E-09	5.485E-10	6.537E-12	1.207E-18
Pa-231	Pa-231	2.285E-09	1.391E-11	1.360E-11	1.301E-11	1.114E-11	7.156E-12	1.518E-12	1.809E-14	3.341E-21
Pa-231	ΣDOSE(j)		5.039E-09	4.928E-09	4.715E-09	4.038E-09	2.593E-09	5.501E-10	6.555E-12	1.211E-18
0Ac-227	Pa-231	2.285E-09	4.450E-13	1.272E-12	2.672E-12	5.572E-12	6.251E-12	1.538E-12	1.836E-14	3.387E-21
Ac-227	U-235	2.285E-09	1.170E-19	7.889E-19	3.836E-18	2.559E-17	9.811E-17	1.031E-16	4.125E-18	2.649E-24
Ac-227	ΣDOSE(j)		4.450E-13	1.272E-12	2.672E-12	5.572E-12	6.251E-12	1.539E-12	1.836E-14	3.389E-21
0Pb-210	Pb-210	1.000E+00	1.856E-03	1.779E-03	1.634E-03	1.215E-03	5.215E-04	2.698E-05	5.701E-09	7.823E-22

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		1.856E-03	1.779E-03	1.634E-03	1.215E-03	5.215E-04	2.698E-05	5.701E-09	7.823E-22
0Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06	2.517E-11	7.356E-11	1.621E-10	3.974E-10	6.578E-10	3.564E-10	1.488E-11	1.699E-16
Pb-210	Ra-226	2.771E-10	5.286E-15	1.545E-14	3.404E-14	8.347E-14	1.382E-13	7.487E-14	3.125E-15	3.569E-20
Pb-210	Ra-226	2.637E-10	5.029E-15	1.470E-14	3.239E-14	7.942E-14	1.314E-13	7.123E-14	2.973E-15	3.396E-20
Pb-210	Ra-226	5.538E-14	1.056E-18	3.088E-18	6.803E-18	1.668E-17	2.761E-17	1.496E-17	6.245E-19	7.133E-24
Pb-210	Ra-226	2.640E-13	5.035E-18	1.472E-17	3.243E-17	7.951E-17	1.316E-16	7.132E-17	2.977E-18	3.400E-23
Pb-210	Th-230	1.319E-06	5.217E-13	3.592E-12	1.829E-11	1.433E-10	8.428E-10	3.191E-09	4.533E-09	4.502E-09
Pb-210	Th-230	2.771E-10	1.096E-16	7.544E-16	3.841E-15	3.010E-14	1.770E-13	6.702E-13	9.522E-13	9.456E-13
Pb-210	Th-230	2.637E-10	1.043E-16	7.177E-16	3.654E-15	2.864E-14	1.684E-13	6.376E-13	9.060E-13	8.997E-13
Pb-210	Th-230	5.538E-14	2.190E-20	1.508E-19	7.675E-19	6.015E-18	3.538E-17	1.339E-16	1.903E-16	1.890E-16
Pb-210	Th-230	2.640E-13	1.044E-19	7.186E-19	3.659E-18	2.867E-17	1.686E-16	6.384E-16	9.071E-16	9.008E-16
Pb-210	U-234	1.319E-06	1.437E-20	2.119E-19	2.379E-18	5.495E-17	9.148E-16	9.745E-15	2.202E-14	2.248E-14
Pb-210	U-234	2.771E-10	3.018E-24	4.450E-23	4.996E-22	1.154E-20	1.921E-19	2.047E-18	4.626E-18	4.721E-18
Pb-210	U-234	2.637E-10	2.872E-24	4.234E-23	4.754E-22	1.098E-20	1.828E-19	1.947E-18	4.401E-18	4.492E-18
Pb-210	U-234	5.538E-14	6.032E-28	8.894E-27	9.985E-26	2.306E-24	3.840E-23	4.090E-22	9.244E-22	9.434E-22
Pb-210	U-234	2.640E-13	2.875E-27	4.239E-26	4.759E-25	1.099E-23	1.830E-22	1.950E-21	4.406E-21	4.497E-21
Pb-210	U-238	2.111E-09	1.297E-29	3.951E-28	9.573E-27	6.497E-25	3.093E-23	9.919E-22	4.229E-21	4.594E-21
Pb-210	U-238	4.434E-13	0.000E+00	8.069E-32	2.006E-30	1.365E-28	6.497E-27	2.083E-25	8.882E-25	9.650E-25
Pb-210	U-238	4.219E-13	0.000E+00	7.677E-32	1.909E-30	1.298E-28	6.181E-27	1.982E-25	8.450E-25	9.181E-25
Pb-210	U-238	8.862E-17	0.000E+00	0.000E+00	0.000E+00	2.652E-32	1.295E-30	4.164E-29	1.775E-28	1.928E-28
Pb-210	U-238	4.224E-16	0.000E+00	0.000E+00	0.000E+00	1.264E-31	6.189E-30	1.985E-28	8.461E-28	9.192E-28
Pb-210	U-238	1.317E-06	8.095E-27	2.465E-25	5.973E-24	4.054E-22	1.930E-20	6.189E-19	2.639E-18	2.867E-18
Pb-210	U-238	2.767E-10	1.697E-30	5.178E-29	1.255E-27	8.516E-26	4.054E-24	1.300E-22	5.542E-22	6.022E-22
Pb-210	U-238	2.633E-10	1.614E-30	4.927E-29	1.194E-27	8.102E-26	3.857E-24	1.237E-22	5.273E-22	5.729E-22
Pb-210	U-238	5.530E-14	0.000E+00	0.000E+00	2.438E-31	1.702E-29	8.101E-28	2.598E-26	1.108E-25	1.203E-25
Pb-210	U-238	2.636E-13	0.000E+00	4.796E-32	1.193E-30	8.112E-29	3.862E-27	1.238E-25	5.279E-25	5.736E-25
Pb-210	ΣDOSE(j)		2.570E-11	7.719E-11	1.804E-10	5.409E-10	1.501E-09	3.549E-09	4.550E-09	4.504E-09
0Ra-226	Ra-226	9.996E-01	2.509E-02	2.469E-02	2.390E-02	2.132E-02	1.540E-02	4.930E-03	1.902E-04	2.134E-09
Ra-226	Ra-226	1.319E-06	3.312E-08	3.258E-08	3.154E-08	2.815E-08	2.033E-08	6.507E-09	2.511E-10	2.816E-15
Ra-226	Th-230	9.996E-01	7.785E-04	2.319E-03	5.325E-03	1.511E-02	3.761E-02	7.725E-02	9.448E-02	9.175E-02
Ra-226	Th-230	1.319E-06	1.028E-09	3.061E-09	7.029E-09	1.994E-08	4.965E-08	1.020E-07	1.247E-07	1.211E-07
Ra-226	Th-230	1.899E-08	1.479E-11	4.405E-11	1.012E-10	2.870E-10	7.146E-10	1.468E-09	1.795E-09	1.743E-09
Ra-226	U-234	9.996E-01	2.851E-11	1.974E-10	1.018E-09	8.338E-09	5.491E-08	2.701E-07	4.634E-07	4.580E-07
Ra-226	U-234	1.319E-06	3.764E-17	2.606E-16	1.344E-15	1.101E-14	7.248E-14	3.565E-13	6.117E-13	6.046E-13
Ra-226	U-234	1.899E-08	5.418E-19	3.751E-18	1.934E-17	1.584E-16	1.043E-15	5.131E-15	8.805E-15	8.703E-15
Ra-226	U-238	1.599E-03	3.212E-20	4.757E-19	5.391E-18	1.288E-16	2.343E-15	3.152E-14	9.067E-14	9.363E-14
Ra-226	U-238	2.111E-09	4.240E-26	6.279E-25	7.116E-24	1.700E-22	3.093E-21	4.160E-20	1.197E-19	1.236E-19
Ra-226	U-238	3.039E-11	6.103E-28	9.038E-27	1.024E-25	2.447E-24	4.452E-23	5.988E-22	1.723E-21	1.779E-21
Ra-226	U-238	9.980E-01	2.004E-17	2.968E-16	3.364E-15	8.036E-14	1.462E-12	1.967E-11	5.658E-11	5.842E-11
Ra-226	U-238	1.317E-06	2.646E-23	3.918E-22	4.441E-21	1.061E-19	1.930E-18	2.596E-17	7.468E-17	7.712E-17
Ra-226	U-238	1.896E-08	3.808E-25	5.639E-24	6.392E-23	1.527E-21	2.778E-20	3.737E-19	1.075E-18	1.110E-18
Ra-226	ΣDOSE(j)		2.587E-02	2.700E-02	2.922E-02	3.643E-02	5.301E-02	8.218E-02	9.468E-02	9.175E-02
0Pb-210	Ra-226	9.996E-01	2.538E-05	7.418E-05	1.634E-04	4.007E-04	6.633E-04	3.594E-04	1.500E-05	1.713E-10

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	5.330E-09	1.558E-08	3.433E-08	8.417E-08	1.393E-07	7.549E-08	3.151E-09	3.599E-14
Pb-210	Ra-226	1.998E-04	5.071E-09	1.482E-08	3.266E-08	8.008E-08	1.325E-07	7.183E-08	2.998E-09	3.424E-14
Pb-210	Ra-226	4.196E-08	1.065E-12	3.114E-12	6.860E-12	1.682E-11	2.784E-11	1.509E-11	6.298E-13	7.192E-18
Pb-210	Ra-226	2.000E-07	5.078E-12	1.484E-11	3.270E-11	8.018E-11	1.327E-10	7.191E-11	3.002E-12	3.428E-17
Pb-210	Th-230	9.996E-01	5.261E-07	3.622E-06	1.844E-05	1.445E-04	8.499E-04	3.217E-03	4.571E-03	4.540E-03
Pb-210	Th-230	2.100E-04	1.105E-10	7.607E-10	3.873E-09	3.035E-08	1.785E-07	6.758E-07	9.602E-07	9.535E-07
Pb-210	Th-230	1.998E-04	1.051E-10	7.238E-10	3.685E-09	2.887E-08	1.698E-07	6.429E-07	9.135E-07	9.072E-07
Pb-210	Th-230	4.196E-08	2.208E-14	1.520E-13	7.739E-13	6.065E-12	3.567E-11	1.350E-10	1.919E-10	1.906E-10
Pb-210	Th-230	2.000E-07	1.053E-13	7.246E-13	3.689E-12	2.891E-11	1.701E-10	6.437E-10	9.146E-10	9.083E-10
Pb-210	U-234	9.996E-01	1.449E-14	2.137E-13	2.399E-12	5.541E-11	9.224E-10	9.826E-09	2.221E-08	2.266E-08
Pb-210	U-234	2.100E-04	3.044E-18	4.488E-17	5.038E-16	1.164E-14	1.937E-13	2.064E-12	4.664E-12	4.760E-12
Pb-210	U-234	1.998E-04	2.896E-18	4.270E-17	4.793E-16	1.107E-14	1.843E-13	1.964E-12	4.438E-12	4.529E-12
Pb-210	U-234	4.196E-08	6.082E-22	8.968E-21	1.007E-19	2.326E-18	3.872E-17	4.125E-16	9.321E-16	9.513E-16
Pb-210	U-234	2.000E-07	2.899E-21	4.275E-20	4.799E-19	1.109E-17	1.846E-16	1.966E-15	4.443E-15	4.535E-15
Pb-210	U-238	1.599E-03	1.308E-23	3.984E-22	9.653E-21	6.552E-19	3.119E-17	1.000E-15	4.264E-15	4.633E-15
Pb-210	U-238	3.359E-07	2.748E-27	8.368E-26	2.028E-24	1.376E-22	6.551E-21	2.101E-19	8.956E-19	9.731E-19
Pb-210	U-238	3.196E-07	2.614E-27	7.961E-26	1.929E-24	1.309E-22	6.233E-21	1.999E-19	8.521E-19	9.258E-19
Pb-210	U-238	6.713E-11	5.429E-31	1.672E-29	4.052E-28	2.750E-26	1.309E-24	4.198E-23	1.790E-22	1.945E-22
Pb-210	U-238	3.200E-10	2.610E-30	7.971E-29	1.931E-27	1.311E-25	6.240E-24	2.001E-22	8.531E-22	9.269E-22
Pb-210	U-238	9.980E-01	8.162E-21	2.486E-19	6.023E-18	4.088E-16	1.946E-14	6.241E-13	2.661E-12	2.891E-12
Pb-210	U-238	2.096E-04	1.714E-24	5.221E-23	1.265E-21	8.587E-20	4.088E-18	1.311E-16	5.589E-16	6.072E-16
Pb-210	U-238	1.994E-04	1.631E-24	4.968E-23	1.204E-21	8.170E-20	3.889E-18	1.247E-16	5.317E-16	5.777E-16
Pb-210	U-238	4.189E-08	3.426E-28	1.043E-26	2.528E-25	1.716E-23	8.169E-22	2.620E-20	1.117E-19	1.213E-19
Pb-210	U-238	1.997E-07	1.633E-27	4.974E-26	1.205E-24	8.180E-23	3.894E-21	1.249E-19	5.324E-19	5.784E-19
Pb-210	ΣDOSE(j)		2.591E-05	7.783E-05	1.820E-04	5.454E-04	1.514E-03	3.578E-03	4.588E-03	4.542E-03
0Ra-226	Ra-226	1.899E-08	4.767E-10	4.690E-10	4.540E-10	4.051E-10	2.926E-10	9.367E-11	3.614E-12	4.054E-17
Ra-226	Ra-226	2.100E-04	5.270E-06	5.185E-06	5.019E-06	4.478E-06	3.234E-06	1.035E-06	3.995E-08	4.481E-13
Ra-226	ΣDOSE(j)		5.270E-06	5.185E-06	5.019E-06	4.479E-06	3.235E-06	1.036E-06	3.996E-08	4.482E-13
0Pb-210	Ra-226	1.899E-08	3.594E-13	1.051E-12	2.315E-12	5.675E-12	9.394E-12	5.090E-12	2.125E-13	2.427E-18
Pb-210	Ra-226	3.989E-12	7.549E-17	2.207E-16	4.862E-16	1.192E-15	1.973E-15	1.069E-15	4.463E-17	5.097E-22
Pb-210	Ra-226	3.795E-12	7.182E-17	2.099E-16	4.626E-16	1.134E-15	1.877E-15	1.017E-15	4.246E-17	4.849E-22
Pb-210	Ra-226	7.972E-16	1.509E-20	4.410E-20	9.716E-20	2.382E-19	3.943E-19	2.137E-19	8.919E-21	1.019E-25
Pb-210	Ra-226	3.800E-15	7.191E-20	2.102E-19	4.631E-19	1.136E-18	1.879E-18	1.018E-18	4.251E-20	4.855E-25
Pb-210	Th-230	1.899E-08	7.450E-15	5.129E-14	2.611E-13	2.046E-12	1.204E-11	4.557E-11	6.474E-11	6.429E-11
Pb-210	Th-230	3.989E-12	1.565E-18	1.077E-17	5.485E-17	4.298E-16	2.528E-15	9.571E-15	1.360E-14	1.350E-14
Pb-210	Th-230	3.795E-12	1.489E-18	1.025E-17	5.218E-17	4.089E-16	2.405E-15	9.106E-15	1.294E-14	1.285E-14
Pb-210	Th-230	7.972E-16	3.127E-22	2.153E-21	1.096E-20	8.589E-20	5.052E-19	1.913E-18	2.718E-18	2.699E-18
Pb-210	Th-230	3.800E-15	1.491E-21	1.026E-20	5.225E-20	4.094E-19	2.408E-18	9.117E-18	1.295E-17	1.286E-17
Pb-210	U-234	1.899E-08	2.052E-22	3.026E-21	3.397E-20	7.847E-19	1.306E-17	1.392E-16	3.145E-16	3.210E-16
Pb-210	U-234	3.989E-12	4.311E-26	6.356E-25	7.135E-24	1.648E-22	2.744E-21	2.923E-20	6.606E-20	6.742E-20
Pb-210	U-234	3.795E-12	4.101E-26	6.047E-25	6.789E-24	1.568E-22	2.611E-21	2.781E-20	6.285E-20	6.414E-20
Pb-210	U-234	7.972E-16	8.614E-30	1.270E-28	1.426E-27	3.294E-26	5.483E-25	5.841E-24	1.320E-23	1.347E-23
Pb-210	U-234	3.800E-15	4.106E-29	6.054E-28	6.797E-27	1.570E-25	2.614E-24	2.784E-23	6.293E-23	6.422E-23
Pb-210	U-238	3.039E-11	1.814E-31	5.642E-30	1.367E-28	9.279E-27	4.417E-25	1.417E-23	6.039E-23	6.561E-23
Pb-210	U-238	6.383E-15	0.000E+00	0.000E+00	2.811E-32	1.945E-30	9.278E-29	2.975E-27	1.268E-26	1.378E-26
Pb-210	U-238	6.073E-15	0.000E+00	0.000E+00	2.674E-32	1.850E-30	8.827E-29	2.831E-27	1.207E-26	1.311E-26
Pb-210	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.815E-32	5.821E-31	2.529E-30	2.748E-30

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.652E-32	2.828E-30	1.208E-29	1.313E-29
Pb-210	U-238	1.896E-08	1.156E-28	3.521E-27	8.531E-26	5.790E-24	2.756E-22	8.839E-21	3.768E-20	4.094E-20
Pb-210	U-238	3.983E-12	2.377E-32	7.379E-31	1.792E-29	1.216E-27	5.789E-26	1.857E-24	7.915E-24	8.600E-24
Pb-210	U-238	3.789E-12	2.261E-32	7.020E-31	1.705E-29	1.157E-27	5.508E-26	1.766E-24	7.530E-24	8.182E-24
Pb-210	U-238	7.959E-16	0.000E+00	0.000E+00	0.000E+00	2.379E-31	1.157E-29	3.710E-28	1.582E-27	1.719E-27
Pb-210	U-238	3.794E-15	0.000E+00	0.000E+00	1.671E-32	1.156E-30	5.515E-29	1.769E-27	7.540E-27	8.192E-27
Pb-210	ΣDOSE(j)		3.670E-13	1.102E-12	2.577E-12	7.725E-12	2.144E-11	5.068E-11	6.498E-11	6.432E-11
0Ra-226	Ra-226	2.771E-10	6.956E-12	6.844E-12	6.625E-12	5.912E-12	4.269E-12	1.367E-12	5.274E-14	5.916E-19
Ra-226	Ra-226	3.989E-12	1.001E-13	9.851E-14	9.536E-14	8.509E-14	6.145E-14	1.967E-14	7.591E-16	8.515E-21
Ra-226	ΣDOSE(j)		7.056E-12	6.942E-12	6.720E-12	5.997E-12	4.331E-12	1.386E-12	5.350E-14	6.001E-19
0Ra-226	Ra-226	1.998E-04	4.408E-06	4.336E-06	4.198E-06	3.746E-06	2.705E-06	8.659E-07	3.340E-08	3.739E-13
Ra-226	Ra-226	2.637E-10	5.818E-12	5.724E-12	5.541E-12	4.944E-12	3.571E-12	1.143E-12	4.409E-14	4.936E-19
Ra-226	Th-230	1.998E-04	1.368E-07	4.073E-07	9.354E-07	2.654E-06	6.607E-06	1.357E-05	1.659E-05	1.608E-05
Ra-226	Th-230	2.637E-10	1.805E-13	5.377E-13	1.235E-12	3.503E-12	8.721E-12	1.791E-11	2.190E-11	2.122E-11
Ra-226	Th-230	3.795E-12	2.598E-15	7.739E-15	1.777E-14	5.042E-14	1.255E-13	2.578E-13	3.152E-13	3.055E-13
Ra-226	U-234	1.998E-04	5.009E-15	3.468E-14	1.788E-13	1.465E-12	9.646E-12	4.743E-11	8.136E-11	8.027E-11
Ra-226	U-234	2.637E-10	6.612E-21	4.578E-20	2.361E-19	1.933E-18	1.273E-17	6.261E-17	1.074E-16	1.060E-16
Ra-226	U-234	3.795E-12	9.517E-23	6.590E-22	3.398E-21	2.783E-20	1.833E-19	9.012E-19	1.546E-18	1.525E-18
Ra-226	U-238	3.196E-07	5.643E-24	8.356E-23	9.470E-22	2.262E-20	4.116E-19	5.536E-18	1.592E-17	1.641E-17
Ra-226	U-238	4.219E-13	7.448E-30	1.103E-28	1.250E-27	2.986E-26	5.434E-25	7.307E-24	2.101E-23	2.166E-23
Ra-226	U-238	6.073E-15	1.058E-31	1.588E-30	1.799E-29	4.298E-28	7.821E-27	1.052E-25	3.025E-25	3.118E-25
Ra-226	U-238	1.994E-04	3.521E-21	5.214E-20	5.909E-19	1.412E-17	2.569E-16	3.454E-15	9.933E-15	1.024E-14
Ra-226	U-238	2.633E-10	4.648E-27	6.883E-26	7.801E-25	1.863E-23	3.391E-22	4.560E-21	1.311E-20	1.352E-20
Ra-226	U-238	3.789E-12	6.690E-29	9.907E-28	1.123E-26	2.682E-25	4.880E-24	6.563E-23	1.887E-22	1.945E-22
Ra-226	ΣDOSE(j)		4.544E-06	4.744E-06	5.133E-06	6.399E-06	9.312E-06	1.443E-05	1.662E-05	1.608E-05
0Ra-226	Ra-226	3.795E-12	8.374E-14	8.239E-14	7.975E-14	7.117E-14	5.140E-14	1.645E-14	6.346E-16	7.105E-21
Ra-226	Ra-226	4.196E-08	9.257E-10	9.108E-10	8.816E-10	7.867E-10	5.682E-10	1.819E-10	7.015E-12	7.854E-17
Ra-226	ΣDOSE(j)		9.258E-10	9.109E-10	8.817E-10	7.868E-10	5.682E-10	1.819E-10	7.015E-12	7.855E-17
0Ra-226	Ra-226	5.538E-14	1.222E-15	1.202E-15	1.164E-15	1.038E-15	7.500E-16	2.401E-16	9.259E-18	1.037E-22
Ra-226	Ra-226	7.972E-16	1.759E-17	1.731E-17	1.675E-17	1.495E-17	1.080E-17	3.455E-18	1.333E-19	1.492E-24
Ra-226	ΣDOSE(j)		1.240E-15	1.220E-15	1.181E-15	1.053E-15	7.608E-16	2.435E-16	9.393E-18	1.052E-22
0Ra-226	Ra-226	2.000E-07	7.991E-11	7.862E-11	7.611E-11	6.792E-11	4.907E-11	1.572E-11	6.087E-13	6.944E-18
Ra-226	Ra-226	2.640E-13	1.055E-16	1.038E-16	1.005E-16	8.966E-17	6.477E-17	2.075E-17	8.035E-19	9.167E-24
Ra-226	Th-230	2.000E-07	2.479E-12	7.385E-12	1.696E-11	4.812E-11	1.198E-10	2.464E-10	3.023E-10	2.986E-10
Ra-226	Th-230	2.640E-13	3.273E-18	9.748E-18	2.239E-17	6.351E-17	1.582E-16	3.252E-16	3.991E-16	3.942E-16
Ra-226	Th-230	3.800E-15	4.711E-20	1.403E-19	3.222E-19	9.142E-19	2.277E-18	4.681E-18	5.744E-18	5.674E-18
Ra-226	U-234	2.000E-07	9.082E-20	6.288E-19	3.242E-18	2.656E-17	1.750E-16	8.613E-16	1.483E-15	1.491E-15
Ra-226	U-234	2.640E-13	1.199E-25	8.300E-25	4.280E-24	3.506E-23	2.310E-22	1.137E-21	1.957E-21	1.968E-21
Ra-226	U-234	3.800E-15	1.726E-27	1.195E-26	6.161E-26	5.046E-25	3.324E-24	1.636E-23	2.817E-23	2.832E-23
Ra-226	U-238	3.200E-10	1.023E-28	1.515E-27	1.717E-26	4.102E-25	7.466E-24	1.005E-22	2.901E-22	3.047E-22
Ra-226	U-238	4.224E-16	0.000E+00	0.000E+00	1.674E-32	5.392E-31	9.856E-30	1.327E-28	3.830E-28	4.022E-28
Ra-226	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.413E-31	1.902E-30	5.512E-30	5.790E-30
Ra-226	U-238	1.997E-07	6.384E-26	9.454E-25	1.071E-23	2.560E-22	4.659E-21	6.273E-20	1.810E-19	1.902E-19
Ra-226	U-238	2.636E-13	8.392E-32	1.243E-30	1.414E-29	3.379E-28	6.150E-27	8.280E-26	2.390E-25	2.510E-25

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	1.326E-32	2.027E-31	4.864E-30	8.852E-29	1.192E-27	3.440E-27	3.613E-27
Ra-226	ΣDOSE(j)		8.239E-11	8.601E-11	9.307E-11	1.160E-10	1.689E-10	2.621E-10	3.029E-10	2.986E-10
0Ra-226	Ra-226	3.800E-15	1.518E-18	1.494E-18	1.446E-18	1.290E-18	9.323E-19	2.987E-19	1.156E-20	1.319E-25
0Ra-228	Ra-228	1.000E+00	6.629E-04	5.784E-04	4.403E-04	1.695E-04	1.108E-05	7.914E-10	1.128E-21	0.000E+00
Ra-228	Th-232	1.000E+00	1.135E-04	3.210E-04	6.600E-04	1.325E-03	1.713E-03	1.736E-03	1.725E-03	1.678E-03
Ra-228	ΣDOSE(j)		7.764E-04	8.994E-04	1.100E-03	1.494E-03	1.724E-03	1.736E-03	1.725E-03	1.678E-03
0Th-228	Ra-228	1.000E+00	1.795E-04	4.335E-04	6.321E-04	4.048E-04	2.916E-05	2.083E-09	2.961E-21	0.000E+00
Th-228	Th-228	1.000E+00	2.716E-03	1.890E-03	9.152E-04	7.228E-05	5.119E-08	4.838E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	2.087E-05	1.275E-04	5.013E-04	1.804E-03	2.788E-03	2.851E-03	2.827E-03	2.723E-03
Th-228	ΣDOSE(j)		2.917E-03	2.451E-03	2.049E-03	2.281E-03	2.817E-03	2.851E-03	2.827E-03	2.723E-03
0Th-230	Th-230	9.996E-01	2.715E-02	2.715E-02	2.715E-02	2.715E-02	2.713E-02	2.708E-02	2.693E-02	2.641E-02
Th-230	Th-230	1.319E-06	3.584E-08	3.584E-08	3.584E-08	3.583E-08	3.581E-08	3.574E-08	3.554E-08	3.486E-08
Th-230	U-234	9.996E-01	1.487E-09	4.418E-09	1.009E-08	2.807E-08	6.642E-08	1.205E-07	1.343E-07	1.319E-07
Th-230	U-234	1.319E-06	1.963E-15	5.831E-15	1.332E-14	3.705E-14	8.767E-14	1.591E-13	1.772E-13	1.740E-13
Th-230	U-234	1.899E-08	2.825E-17	8.394E-17	1.917E-16	5.332E-16	1.262E-15	2.290E-15	2.551E-15	2.505E-15
Th-230	U-234	2.100E-04	3.124E-13	9.279E-13	2.119E-12	5.895E-12	1.395E-11	2.531E-11	2.820E-11	2.769E-11
Th-230	U-234	2.771E-10	4.123E-19	1.225E-18	2.797E-18	7.781E-18	1.842E-17	3.341E-17	3.722E-17	3.656E-17
Th-230	U-234	3.989E-12	5.935E-21	1.763E-20	4.026E-20	1.120E-19	2.651E-19	4.810E-19	5.358E-19	5.262E-19
Th-230	U-234	1.998E-04	2.972E-13	8.828E-13	2.016E-12	5.609E-12	1.327E-11	2.408E-11	2.683E-11	2.635E-11
Th-230	U-234	2.637E-10	3.923E-19	1.165E-18	2.661E-18	7.403E-18	1.752E-17	3.179E-17	3.542E-17	3.478E-17
Th-230	U-234	3.795E-12	5.646E-21	1.677E-20	3.830E-20	1.066E-19	2.522E-19	4.576E-19	5.098E-19	5.006E-19
Th-230	U-234	4.196E-08	6.242E-17	1.854E-16	4.234E-16	1.178E-15	2.788E-15	5.059E-15	5.636E-15	5.535E-15
Th-230	U-234	5.538E-14	8.240E-23	2.448E-22	5.589E-22	1.555E-21	3.680E-21	6.678E-21	7.439E-21	7.306E-21
Th-230	U-234	7.972E-16	1.186E-24	3.523E-24	8.045E-24	2.238E-23	5.297E-23	9.612E-23	1.071E-22	1.052E-22
Th-230	U-234	2.000E-07	2.975E-16	8.839E-16	2.018E-15	5.615E-15	1.329E-14	2.411E-14	2.686E-14	2.638E-14
Th-230	U-234	2.640E-13	3.928E-22	1.167E-21	2.664E-21	7.412E-21	1.754E-20	3.183E-20	3.546E-20	3.482E-20
Th-230	U-234	3.800E-15	5.653E-24	1.679E-23	3.835E-23	1.067E-22	2.525E-22	4.582E-22	5.104E-22	5.012E-22
Th-230	U-238	1.599E-03	2.231E-18	1.542E-17	7.922E-17	6.403E-16	4.066E-15	1.798E-14	2.721E-14	2.695E-14
Th-230	U-238	2.111E-09	2.945E-24	2.036E-23	1.046E-22	8.452E-22	5.367E-21	2.373E-20	3.591E-20	3.558E-20
Th-230	U-238	3.039E-11	4.239E-26	2.930E-25	1.505E-24	1.217E-23	7.725E-23	3.416E-22	5.169E-22	5.121E-22
Th-230	U-238	3.359E-07	4.686E-22	3.239E-21	1.664E-20	1.345E-19	8.540E-19	3.776E-18	5.714E-18	5.661E-18
Th-230	U-238	4.434E-13	6.186E-28	4.276E-27	2.197E-26	1.775E-25	1.127E-24	4.984E-24	7.543E-24	7.473E-24
Th-230	U-238	6.383E-15	8.904E-30	6.154E-29	3.162E-28	2.555E-27	1.623E-26	7.174E-26	1.086E-25	1.076E-25
Th-230	U-238	3.196E-07	4.459E-22	3.082E-21	1.583E-20	1.280E-19	8.125E-19	3.592E-18	5.437E-18	5.386E-18
Th-230	U-238	4.219E-13	5.885E-28	4.068E-27	2.090E-26	1.689E-25	1.073E-24	4.742E-24	7.177E-24	7.110E-24
Th-230	U-238	6.073E-15	8.471E-30	5.855E-29	3.008E-28	2.431E-27	1.544E-26	6.826E-26	1.033E-25	1.023E-25
Th-230	U-238	6.713E-11	9.365E-26	6.473E-25	3.325E-24	2.688E-23	1.707E-22	7.546E-22	1.142E-21	1.131E-21
Th-230	U-238	8.862E-17	1.218E-31	8.545E-31	4.390E-30	3.548E-29	2.253E-28	9.960E-28	1.507E-27	1.493E-27
Th-230	U-238	1.276E-18	0.000E+00	0.000E+00	6.225E-32	5.032E-31	3.243E-30	1.434E-29	2.170E-29	2.150E-29
Th-230	U-238	3.200E-10	4.464E-25	3.086E-24	1.585E-23	1.281E-22	8.135E-22	3.597E-21	5.443E-21	5.393E-21
Th-230	U-238	4.224E-16	5.806E-31	4.073E-30	2.092E-29	1.691E-28	1.074E-27	4.748E-27	7.185E-27	7.118E-27
Th-230	U-238	6.080E-18	0.000E+00	5.776E-32	2.967E-31	2.434E-30	1.546E-29	6.834E-29	1.034E-28	1.025E-28
Th-230	U-238	9.980E-01	1.392E-15	9.623E-15	4.943E-14	3.995E-13	2.537E-12	1.122E-11	1.698E-11	1.682E-11
Th-230	U-238	1.317E-06	1.838E-21	1.270E-20	6.525E-20	5.274E-19	3.349E-18	1.481E-17	2.241E-17	2.220E-17
Th-230	U-238	1.896E-08	2.645E-23	1.828E-22	9.393E-22	7.591E-21	4.820E-20	2.131E-19	3.226E-19	3.195E-19

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 42
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	2.924E-19	2.021E-18	1.038E-17	8.392E-17	5.329E-16	2.356E-15	3.566E-15	3.533E-15
Th-230	U-238	2.767E-10	3.860E-25	2.668E-24	1.371E-23	1.108E-22	7.034E-22	3.110E-21	4.707E-21	4.663E-21
Th-230	U-238	3.983E-12	5.556E-27	3.840E-26	1.973E-25	1.595E-24	1.012E-23	4.477E-23	6.775E-23	6.712E-23
Th-230	U-238	1.994E-04	2.782E-19	1.923E-18	9.879E-18	7.985E-17	5.070E-16	2.242E-15	3.393E-15	3.361E-15
Th-230	U-238	2.633E-10	3.672E-25	2.538E-24	1.304E-23	1.054E-22	6.692E-22	2.959E-21	4.478E-21	4.436E-21
Th-230	U-238	3.789E-12	5.286E-27	3.654E-26	1.877E-25	1.517E-24	9.633E-24	4.259E-23	6.446E-23	6.386E-23
Th-230	U-238	4.189E-08	5.844E-23	4.039E-22	2.075E-21	1.677E-20	1.065E-19	4.709E-19	7.126E-19	7.059E-19
Th-230	U-238	5.530E-14	7.714E-29	5.332E-28	2.739E-27	2.214E-26	1.406E-25	6.215E-25	9.406E-25	9.319E-25
Th-230	U-238	7.959E-16	1.110E-30	7.675E-30	3.943E-29	3.187E-28	2.023E-27	8.946E-27	1.354E-26	1.341E-26
Th-230	U-238	1.997E-07	2.785E-22	1.925E-21	9.891E-21	7.994E-20	5.076E-19	2.244E-18	3.397E-18	3.365E-18
Th-230	U-238	2.636E-13	3.677E-28	2.542E-27	1.306E-26	1.055E-25	6.701E-25	2.963E-24	4.484E-24	4.442E-24
Th-230	U-238	3.794E-15	5.292E-30	3.658E-29	1.879E-28	1.519E-27	9.645E-27	4.264E-26	6.454E-26	6.394E-26
Th-230	ΣDOSE(j)		2.715E-02	2.715E-02	2.715E-02	2.715E-02	2.713E-02	2.708E-02	2.693E-02	2.641E-02
0Th-230	Th-230	1.899E-08	5.159E-10	5.159E-10	5.159E-10	5.158E-10	5.155E-10	5.145E-10	5.116E-10	5.018E-10
Th-230	Th-230	2.100E-04	5.703E-06	5.703E-06	5.703E-06	5.702E-06	5.698E-06	5.687E-06	5.656E-06	5.547E-06
Th-230	ΣDOSE(j)		5.704E-06	5.704E-06	5.703E-06	5.702E-06	5.699E-06	5.688E-06	5.657E-06	5.548E-06
0Ra-226	Th-230	2.100E-04	1.635E-07	4.870E-07	1.118E-06	3.173E-06	7.900E-06	1.623E-05	1.985E-05	1.927E-05
Ra-226	Th-230	3.989E-12	3.107E-15	9.253E-15	2.125E-14	6.028E-14	1.501E-13	3.083E-13	3.771E-13	3.661E-13
Ra-226	U-234	2.100E-04	5.989E-15	4.147E-14	2.138E-13	1.751E-12	1.153E-11	5.672E-11	9.733E-11	9.621E-11
Ra-226	U-234	2.771E-10	7.906E-21	5.474E-20	2.822E-19	2.312E-18	1.522E-17	7.487E-17	1.285E-16	1.270E-16
Ra-226	U-234	3.989E-12	1.138E-22	7.879E-22	4.063E-21	3.327E-20	2.191E-19	1.078E-18	1.849E-18	1.828E-18
Ra-226	U-238	3.359E-07	6.747E-24	9.991E-23	1.132E-21	2.705E-20	4.922E-19	6.620E-18	1.904E-17	1.967E-17
Ra-226	U-238	4.434E-13	8.905E-30	1.319E-28	1.495E-27	3.570E-26	6.497E-25	8.738E-24	2.514E-23	2.596E-23
Ra-226	U-238	6.383E-15	1.267E-31	1.898E-30	2.151E-29	5.139E-28	9.351E-27	1.258E-25	3.618E-25	3.736E-25
Ra-226	U-238	2.096E-04	4.210E-21	6.234E-20	7.066E-19	1.688E-17	3.071E-16	4.131E-15	1.188E-14	1.227E-14
Ra-226	U-238	2.767E-10	5.557E-27	8.229E-26	9.327E-25	2.228E-23	4.054E-22	5.453E-21	1.569E-20	1.620E-20
Ra-226	U-238	3.983E-12	7.999E-29	1.184E-27	1.342E-26	3.207E-25	5.835E-24	7.849E-23	2.258E-22	2.332E-22
Ra-226	ΣDOSE(j)		1.635E-07	4.870E-07	1.118E-06	3.173E-06	7.900E-06	1.623E-05	1.985E-05	1.927E-05
0Th-230	Th-230	2.771E-10	7.528E-12	7.528E-12	7.528E-12	7.526E-12	7.522E-12	7.507E-12	7.466E-12	7.323E-12
Th-230	Th-230	3.989E-12	1.084E-13	1.084E-13	1.084E-13	1.083E-13	1.083E-13	1.081E-13	1.075E-13	1.054E-13
Th-230	ΣDOSE(j)		7.637E-12	7.636E-12	7.636E-12	7.635E-12	7.630E-12	7.616E-12	7.573E-12	7.428E-12
0Ra-226	Th-230	2.771E-10	2.158E-13	6.428E-13	1.476E-12	4.188E-12	1.043E-11	2.142E-11	2.620E-11	2.544E-11
0Th-230	Th-230	1.998E-04	5.426E-06	5.426E-06	5.426E-06	5.425E-06	5.422E-06	5.411E-06	5.381E-06	5.278E-06
Th-230	Th-230	2.637E-10	7.163E-12	7.162E-12	7.162E-12	7.161E-12	7.157E-12	7.143E-12	7.103E-12	6.967E-12
Th-230	ΣDOSE(j)		5.426E-06	5.426E-06	5.426E-06	5.425E-06	5.422E-06	5.411E-06	5.381E-06	5.278E-06
0Th-230	Th-230	3.795E-12	1.031E-13	1.031E-13	1.031E-13	1.031E-13	1.030E-13	1.028E-13	1.022E-13	1.003E-13
Th-230	Th-230	4.196E-08	1.140E-09	1.140E-09	1.140E-09	1.139E-09	1.139E-09	1.137E-09	1.130E-09	1.109E-09
Th-230	ΣDOSE(j)		1.140E-09	1.140E-09	1.140E-09	1.140E-09	1.139E-09	1.137E-09	1.130E-09	1.109E-09
0Ra-226	Th-230	4.196E-08	2.872E-11	8.555E-11	1.965E-10	5.573E-10	1.388E-09	2.850E-09	3.484E-09	3.377E-09
Ra-226	Th-230	7.972E-16	5.457E-19	1.625E-18	3.733E-18	1.059E-17	2.637E-17	5.415E-17	6.620E-17	6.417E-17
Ra-226	U-234	4.196E-08	1.052E-18	7.284E-18	3.756E-17	3.076E-16	2.026E-15	9.962E-15	1.709E-14	1.686E-14
Ra-226	U-234	5.538E-14	1.389E-24	9.615E-24	4.958E-23	4.061E-22	2.674E-21	1.315E-20	2.256E-20	2.226E-20

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:44 Page 43
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	1.999E-26	1.384E-25	7.137E-25	5.845E-24	3.849E-23	1.893E-22	3.247E-22	3.203E-22
Ra-226	U-238	6.713E-11	1.185E-27	1.755E-26	1.989E-25	4.751E-24	8.646E-23	1.163E-21	3.343E-21	3.446E-21
Ra-226	U-238	8.862E-17	0.000E+00	2.285E-32	2.590E-31	6.271E-30	1.141E-28	1.535E-27	4.413E-27	4.549E-27
Ra-226	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	8.906E-32	1.643E-30	2.209E-29	6.352E-29	6.548E-29
Ra-226	U-238	4.189E-08	7.396E-25	1.095E-23	1.241E-22	2.965E-21	5.395E-20	7.255E-19	2.086E-18	2.151E-18
Ra-226	U-238	5.530E-14	9.762E-31	1.445E-29	1.638E-28	3.914E-27	7.121E-26	9.577E-25	2.754E-24	2.839E-24
Ra-226	U-238	7.959E-16	1.386E-32	2.053E-31	2.358E-30	5.633E-29	1.025E-27	1.378E-26	3.964E-26	4.086E-26
Ra-226	ΣDOSE(j)		2.872E-11	8.555E-11	1.965E-10	5.573E-10	1.388E-09	2.850E-09	3.484E-09	3.377E-09
0Th-230	Th-230	5.538E-14	1.504E-15	1.504E-15	1.504E-15	1.504E-15	1.503E-15	1.500E-15	1.492E-15	1.463E-15
Th-230	Th-230	7.972E-16	2.165E-17	2.165E-17	2.165E-17	2.165E-17	2.164E-17	2.160E-17	2.148E-17	2.106E-17
Th-230	ΣDOSE(j)		1.526E-15	1.526E-15	1.526E-15	1.526E-15	1.525E-15	1.522E-15	1.513E-15	1.484E-15
0Ra-226	Th-230	5.538E-14	3.791E-17	1.129E-16	2.593E-16	7.357E-16	1.832E-15	3.762E-15	4.599E-15	4.458E-15
0Th-230	Th-230	2.000E-07	5.433E-09	5.433E-09	5.432E-09	5.431E-09	5.428E-09	5.418E-09	5.388E-09	5.284E-09
Th-230	Th-230	2.640E-13	7.171E-15	7.171E-15	7.171E-15	7.169E-15	7.165E-15	7.151E-15	7.112E-15	6.975E-15
Th-230	ΣDOSE(j)		5.433E-09	5.433E-09	5.432E-09	5.431E-09	5.428E-09	5.418E-09	5.388E-09	5.284E-09
0Th-230	Th-230	3.800E-15	1.032E-16	1.032E-16	1.032E-16	1.032E-16	1.031E-16	1.029E-16	1.024E-16	1.004E-16
0Th-232	Th-232	1.000E+00	1.340E-04	1.340E-04	1.339E-04	1.339E-04	1.339E-04	1.337E-04	1.332E-04	1.315E-04
0U-234	U-234	9.996E-01	1.535E-04	1.501E-04	1.436E-04	1.230E-04	7.902E-05	1.679E-05	2.008E-07	3.758E-14
U-234	U-234	1.319E-06	2.026E-10	1.982E-10	1.896E-10	1.624E-10	1.043E-10	2.216E-11	2.650E-13	4.961E-20
U-234	U-238	1.599E-03	3.454E-13	1.016E-12	2.270E-12	5.834E-12	1.089E-11	7.622E-12	2.727E-13	1.701E-19
U-234	U-238	2.111E-09	4.559E-19	1.341E-18	2.996E-18	7.701E-18	1.437E-17	1.006E-17	3.599E-19	2.245E-25
U-234	U-238	3.039E-11	6.563E-21	1.930E-20	4.312E-20	1.108E-19	2.069E-19	1.448E-19	5.181E-21	3.232E-27
U-234	U-238	3.359E-07	7.255E-17	2.134E-16	4.767E-16	1.225E-15	2.287E-15	1.601E-15	5.728E-17	3.573E-23
U-234	U-238	4.434E-13	9.577E-23	2.817E-22	6.293E-22	1.618E-21	3.019E-21	2.113E-21	7.560E-23	4.716E-29
U-234	U-238	6.383E-15	1.378E-24	4.055E-24	9.058E-24	2.328E-23	4.345E-23	3.042E-23	1.088E-24	6.718E-31
U-234	U-238	3.196E-07	6.902E-17	2.030E-16	4.536E-16	1.166E-15	2.176E-15	1.523E-15	5.449E-17	3.399E-23
U-234	U-238	4.219E-13	9.111E-23	2.680E-22	5.987E-22	1.539E-21	2.872E-21	2.011E-21	7.193E-23	4.487E-29
U-234	U-238	6.073E-15	1.311E-24	3.858E-24	8.618E-24	2.215E-23	4.134E-23	2.894E-23	1.035E-24	6.392E-31
U-234	U-238	6.713E-11	1.450E-20	4.265E-20	9.527E-20	2.449E-19	4.570E-19	3.199E-19	1.145E-20	7.140E-27
U-234	U-238	8.862E-17	1.914E-26	5.630E-26	1.258E-25	3.232E-25	6.032E-25	4.223E-25	1.511E-26	0.000E+00
U-234	U-238	1.276E-18	2.755E-28	8.103E-28	1.810E-27	4.653E-27	8.683E-27	6.079E-27	2.175E-28	0.000E+00
U-234	U-238	3.200E-10	6.911E-20	2.033E-19	4.541E-19	1.167E-18	2.178E-18	1.525E-18	5.456E-20	3.403E-26
U-234	U-238	4.224E-16	9.122E-26	2.683E-25	5.994E-25	1.541E-24	2.875E-24	2.013E-24	7.202E-26	4.446E-32
U-234	U-238	6.080E-18	1.313E-27	3.862E-27	8.628E-27	2.218E-26	4.139E-26	2.898E-26	1.037E-27	0.000E+00
U-234	U-238	9.980E-01	2.155E-10	6.340E-10	1.416E-09	3.640E-09	6.794E-09	4.756E-09	1.702E-10	1.061E-16
U-234	U-238	1.317E-06	2.845E-16	8.369E-16	1.869E-15	4.805E-15	8.968E-15	6.278E-15	2.246E-16	1.401E-22
U-234	U-238	1.896E-08	4.095E-18	1.205E-17	2.691E-17	6.917E-17	1.291E-16	9.037E-17	3.233E-18	2.017E-24
U-234	U-238	2.096E-04	4.527E-14	1.332E-13	2.975E-13	7.646E-13	1.427E-12	9.990E-13	3.574E-14	2.229E-20
U-234	U-238	2.767E-10	5.976E-20	1.758E-19	3.927E-19	1.009E-18	1.884E-18	1.319E-18	4.718E-20	2.943E-26
U-234	U-238	3.983E-12	8.601E-22	2.530E-21	5.652E-21	1.453E-20	2.711E-20	1.898E-20	6.791E-22	4.236E-28
U-234	U-238	1.994E-04	4.307E-14	1.267E-13	2.830E-13	7.275E-13	1.358E-12	9.505E-13	3.400E-14	2.121E-20
U-234	U-238	2.633E-10	5.685E-20	1.672E-19	3.736E-19	9.603E-19	1.792E-18	1.255E-18	4.488E-20	2.800E-26
U-234	U-238	3.789E-12	8.184E-22	2.407E-21	5.378E-21	1.382E-20	2.580E-20	1.806E-20	6.461E-22	4.030E-28

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	9.047E-18	2.661E-17	5.945E-17	1.528E-16	2.852E-16	1.996E-16	7.142E-18	4.455E-24
U-234	U-238	5.530E-14	1.194E-23	3.513E-23	7.847E-23	2.017E-22	3.764E-22	2.635E-22	9.428E-24	5.881E-30
U-234	U-238	7.959E-16	1.719E-25	5.056E-25	1.130E-24	2.903E-24	5.418E-24	3.793E-24	1.357E-25	8.378E-32
U-234	U-238	1.997E-07	4.312E-17	1.269E-16	2.834E-16	7.284E-16	1.359E-15	9.516E-16	3.404E-17	2.124E-23
U-234	U-238	2.636E-13	5.692E-23	1.674E-22	3.741E-22	9.615E-22	1.794E-21	1.256E-21	4.494E-23	2.803E-29
U-234	U-238	3.794E-15	8.194E-25	2.410E-24	5.384E-24	1.384E-23	2.583E-23	1.808E-23	6.469E-25	3.993E-31
U-234	ΣDOSE(j)		1.535E-04	1.501E-04	1.436E-04	1.230E-04	7.903E-05	1.679E-05	2.010E-07	3.769E-14
0U-234	U-234	1.899E-08	2.916E-12	2.852E-12	2.729E-12	2.337E-12	1.501E-12	3.189E-13	3.815E-15	7.141E-22
U-234	U-234	2.100E-04	3.224E-08	3.153E-08	3.017E-08	2.584E-08	1.660E-08	3.526E-09	4.217E-11	7.894E-18
U-234	ΣDOSE(j)		3.224E-08	3.154E-08	3.017E-08	2.584E-08	1.660E-08	3.526E-09	4.218E-11	7.895E-18
0U-234	U-234	2.771E-10	4.255E-14	4.162E-14	3.982E-14	3.411E-14	2.191E-14	4.654E-15	5.567E-17	1.042E-23
U-234	U-234	3.989E-12	6.125E-16	5.991E-16	5.732E-16	4.909E-16	3.154E-16	6.699E-17	8.013E-19	1.500E-25
U-234	ΣDOSE(j)		4.317E-14	4.222E-14	4.039E-14	3.460E-14	2.222E-14	4.721E-15	5.647E-17	1.057E-23
0U-234	U-234	1.998E-04	3.067E-08	3.000E-08	2.870E-08	2.458E-08	1.579E-08	3.355E-09	4.013E-11	7.510E-18
U-234	U-234	2.637E-10	4.049E-14	3.960E-14	3.789E-14	3.245E-14	2.084E-14	4.428E-15	5.297E-17	9.914E-24
U-234	ΣDOSE(j)		3.067E-08	3.000E-08	2.870E-08	2.458E-08	1.579E-08	3.355E-09	4.013E-11	7.510E-18
0U-234	U-234	3.795E-12	5.828E-16	5.700E-16	5.453E-16	4.671E-16	3.000E-16	6.374E-17	7.624E-19	1.427E-25
U-234	U-234	4.196E-08	6.443E-12	6.302E-12	6.029E-12	5.164E-12	3.317E-12	7.046E-13	8.428E-15	1.577E-21
U-234	ΣDOSE(j)		6.443E-12	6.302E-12	6.029E-12	5.164E-12	3.317E-12	7.047E-13	8.429E-15	1.578E-21
0U-234	U-234	5.538E-14	8.504E-18	8.318E-18	7.958E-18	6.816E-18	4.378E-18	9.301E-19	1.113E-20	2.082E-27
U-234	U-234	7.972E-16	1.224E-19	1.197E-19	1.145E-19	9.811E-20	6.302E-20	1.339E-20	1.601E-22	2.997E-29
U-234	ΣDOSE(j)		8.627E-18	8.438E-18	8.072E-18	6.914E-18	4.441E-18	9.435E-19	1.129E-20	2.112E-27
0U-234	U-234	2.000E-07	3.071E-11	3.004E-11	2.874E-11	2.461E-11	1.581E-11	3.359E-12	4.017E-14	7.519E-21
U-234	U-234	2.640E-13	4.054E-17	3.965E-17	3.793E-17	3.249E-17	2.087E-17	4.433E-18	5.303E-20	9.926E-27
U-234	ΣDOSE(j)		3.071E-11	3.004E-11	2.874E-11	2.461E-11	1.581E-11	3.359E-12	4.017E-14	7.519E-21
0U-234	U-234	3.800E-15	5.835E-19	5.707E-19	5.460E-19	4.676E-19	3.004E-19	6.381E-20	7.633E-22	1.429E-28
0U-235	U-235	9.835E-01	1.323E-04	1.294E-04	1.238E-04	1.061E-04	6.813E-05	1.448E-05	1.733E-07	3.248E-14
U-235	U-235	2.722E-03	3.662E-07	3.582E-07	3.427E-07	2.935E-07	1.886E-07	4.007E-08	4.796E-10	8.988E-17
U-235	ΣDOSE(j)		1.327E-04	1.298E-04	1.242E-04	1.063E-04	6.832E-05	1.452E-05	1.738E-07	3.257E-14
0U-235	U-235	1.376E-02	1.851E-06	1.811E-06	1.732E-06	1.484E-06	9.533E-07	2.026E-07	2.425E-09	4.544E-16
U-235	U-235	3.809E-05	5.124E-09	5.012E-09	4.795E-09	4.107E-09	2.638E-09	5.606E-10	6.711E-12	1.258E-18
U-235	ΣDOSE(j)		1.857E-06	1.816E-06	1.737E-06	1.488E-06	9.559E-07	2.031E-07	2.432E-09	4.557E-16
0U-235	U-235	8.257E-07	1.111E-10	1.087E-10	1.040E-10	8.904E-11	5.720E-11	1.215E-11	1.455E-13	2.727E-20
U-235	U-235	2.285E-09	3.075E-13	3.007E-13	2.877E-13	2.464E-13	1.583E-13	3.364E-14	4.027E-16	7.546E-23
U-235	ΣDOSE(j)		1.114E-10	1.090E-10	1.042E-10	8.929E-11	5.736E-11	1.219E-11	1.459E-13	2.734E-20
0U-238	U-238	5.450E-07	7.468E-11	7.305E-11	6.989E-11	5.986E-11	3.845E-11	8.170E-12	9.778E-14	1.834E-20
U-238	U-238	1.599E-03	7.171E-05	7.014E-05	6.710E-05	5.747E-05	3.691E-05	7.839E-06	9.363E-08	1.735E-14
U-238	ΣDOSE(j)		7.171E-05	7.014E-05	6.710E-05	5.747E-05	3.691E-05	7.839E-06	9.363E-08	1.735E-14

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	9.466E-11	9.259E-11	8.858E-11	7.586E-11	4.873E-11	1.035E-11	1.236E-13	2.290E-20
U-238	U-238	3.039E-11	1.363E-12	1.333E-12	1.275E-12	1.092E-12	7.014E-13	1.489E-13	1.779E-15	3.296E-22
U-238	ΣDOSE(j)		9.602E-11	9.392E-11	8.985E-11	7.696E-11	4.943E-11	1.050E-11	1.254E-13	2.323E-20
0U-238	U-238	3.359E-07	1.506E-08	1.473E-08	1.409E-08	1.207E-08	7.754E-09	1.647E-09	1.967E-11	3.643E-18
U-238	U-238	4.434E-13	1.988E-14	1.945E-14	1.861E-14	1.593E-14	1.023E-14	2.173E-15	2.596E-17	4.809E-24
U-238	ΣDOSE(j)		1.506E-08	1.473E-08	1.409E-08	1.207E-08	7.754E-09	1.647E-09	1.967E-11	3.643E-18
0U-238	U-238	6.383E-15	2.862E-16	2.799E-16	2.678E-16	2.294E-16	1.473E-16	3.128E-17	3.737E-19	6.922E-26
U-238	U-238	3.196E-07	1.433E-08	1.402E-08	1.341E-08	1.149E-08	7.377E-09	1.567E-09	1.871E-11	3.466E-18
U-238	ΣDOSE(j)		1.433E-08	1.402E-08	1.341E-08	1.149E-08	7.377E-09	1.567E-09	1.871E-11	3.466E-18
0U-238	U-238	4.219E-13	1.892E-14	1.850E-14	1.770E-14	1.516E-14	9.738E-15	2.068E-15	2.470E-17	4.576E-24
U-238	U-238	6.073E-15	2.723E-16	2.663E-16	2.548E-16	2.182E-16	1.402E-16	2.976E-17	3.555E-19	6.586E-26
U-238	ΣDOSE(j)		1.919E-14	1.877E-14	1.796E-14	1.538E-14	9.878E-15	2.098E-15	2.505E-17	4.642E-24
0U-238	U-238	6.713E-11	3.010E-12	2.944E-12	2.817E-12	2.412E-12	1.549E-12	3.290E-13	3.930E-15	7.281E-22
U-238	U-238	8.862E-17	3.973E-18	3.886E-18	3.718E-18	3.184E-18	2.045E-18	4.343E-19	5.188E-21	9.611E-28
U-238	ΣDOSE(j)		3.010E-12	2.944E-12	2.817E-12	2.412E-12	1.549E-12	3.290E-13	3.930E-15	7.281E-22
0U-238	U-238	1.276E-18	5.719E-20	5.594E-20	5.352E-20	4.584E-20	2.944E-20	6.252E-21	7.467E-23	1.383E-29
U-238	U-238	3.200E-10	1.435E-11	1.403E-11	1.343E-11	1.150E-11	7.386E-12	1.568E-12	1.873E-14	3.471E-21
U-238	ΣDOSE(j)		1.435E-11	1.403E-11	1.343E-11	1.150E-11	7.386E-12	1.568E-12	1.873E-14	3.471E-21
0U-238	U-238	4.224E-16	1.894E-17	1.853E-17	1.772E-17	1.518E-17	9.749E-18	2.070E-18	2.473E-20	4.581E-27
U-238	U-238	6.080E-18	2.726E-19	2.667E-19	2.551E-19	2.185E-19	1.403E-19	2.980E-20	3.559E-22	6.594E-29
U-238	ΣDOSE(j)		1.921E-17	1.879E-17	1.798E-17	1.540E-17	9.890E-18	2.100E-18	2.508E-20	4.647E-27
0U-238	U-238	9.980E-01	5.799E-04	5.672E-04	5.426E-04	4.648E-04	2.985E-04	6.342E-05	7.583E-07	1.413E-13
U-238	U-238	1.317E-06	7.655E-10	7.487E-10	7.163E-10	6.135E-10	3.941E-10	8.371E-11	1.001E-12	1.865E-19
U-238	ΣDOSE(j)		5.799E-04	5.672E-04	5.426E-04	4.648E-04	2.985E-04	6.342E-05	7.583E-07	1.413E-13
0U-238	U-238	1.896E-08	1.102E-11	1.078E-11	1.031E-11	8.831E-12	5.672E-12	1.205E-12	1.441E-14	2.685E-21
U-238	U-238	2.096E-04	1.218E-07	1.191E-07	1.140E-07	9.762E-08	6.271E-08	1.332E-08	1.593E-10	2.968E-17
U-238	ΣDOSE(j)		1.218E-07	1.191E-07	1.140E-07	9.763E-08	6.271E-08	1.332E-08	1.593E-10	2.969E-17
0U-238	U-238	2.767E-10	1.608E-13	1.573E-13	1.505E-13	1.289E-13	8.277E-14	1.758E-14	2.102E-16	3.918E-23
U-238	U-238	3.983E-12	2.314E-15	2.264E-15	2.166E-15	1.855E-15	1.191E-15	2.531E-16	3.026E-18	5.640E-25
U-238	ΣDOSE(j)		1.631E-13	1.595E-13	1.526E-13	1.307E-13	8.397E-14	1.784E-14	2.133E-16	3.975E-23
0U-238	U-238	1.994E-04	1.159E-07	1.134E-07	1.084E-07	9.288E-08	5.966E-08	1.267E-08	1.515E-10	2.824E-17
U-238	U-238	2.633E-10	1.530E-13	1.496E-13	1.431E-13	1.226E-13	7.875E-14	1.673E-14	2.000E-16	3.728E-23
U-238	ΣDOSE(j)		1.159E-07	1.134E-07	1.084E-07	9.288E-08	5.966E-08	1.267E-08	1.515E-10	2.824E-17
0U-238	U-238	3.789E-12	2.202E-15	2.154E-15	2.060E-15	1.765E-15	1.134E-15	2.408E-16	2.879E-18	5.366E-25
U-238	U-238	4.189E-08	2.434E-11	2.381E-11	2.278E-11	1.951E-11	1.253E-11	2.662E-12	3.183E-14	5.932E-21
U-238	ΣDOSE(j)		2.434E-11	2.381E-11	2.278E-11	1.951E-11	1.253E-11	2.662E-12	3.183E-14	5.932E-21
0U-238	U-238	5.530E-14	3.213E-17	3.143E-17	3.007E-17	2.575E-17	1.654E-17	3.514E-18	4.201E-20	7.830E-27

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	4.625E-19	4.524E-19	4.328E-19	3.707E-19	2.381E-19	5.058E-20	6.048E-22	1.127E-28
U-238	ΣDOSE(j)		3.259E-17	3.188E-17	3.050E-17	2.612E-17	1.678E-17	3.564E-18	4.262E-20	7.943E-27
0U-238	U-238	1.997E-07	1.160E-10	1.135E-10	1.086E-10	9.299E-11	5.973E-11	1.269E-11	1.517E-13	2.828E-20
U-238	U-238	2.636E-13	1.532E-16	1.498E-16	1.433E-16	1.227E-16	7.885E-17	1.675E-17	2.003E-19	3.732E-26
U-238	ΣDOSE(j)		1.160E-10	1.135E-10	1.086E-10	9.299E-11	5.973E-11	1.269E-11	1.517E-13	2.828E-20
0U-238	U-238	3.794E-15	2.205E-18	2.156E-18	2.063E-18	1.767E-18	1.135E-18	2.411E-19	2.883E-21	5.372E-28

THF(i) is the thread fraction of the parent nuclide.

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	6.884E-03	6.312E-03	5.306E-03	2.890E-03	5.092E-04	1.170E-06	3.375E-14	1.378E-40
Ac-227	Ac-227	2.722E-03	1.905E-05	1.747E-05	1.469E-05	7.998E-06	1.409E-06	3.237E-09	9.341E-17	3.812E-43
Ac-227	Pa-231	9.835E-01	0.000E+00	4.152E-04	1.119E-03	2.587E-03	2.987E-03	7.390E-04	8.821E-06	1.630E-12
Ac-227	U-235	9.835E-01	0.000E+00	1.649E-10	1.361E-09	1.125E-08	4.595E-08	4.923E-08	1.978E-09	1.274E-15
Ac-227	ΣS(j):		6.903E-03	6.745E-03	6.439E-03	5.485E-03	3.498E-03	7.402E-04	8.823E-06	1.631E-12
0Ac-227	Ac-227	1.376E-02	9.633E-05	8.832E-05	7.424E-05	4.044E-05	7.125E-06	1.636E-08	4.723E-16	1.928E-42
Ac-227	Ac-227	3.809E-05	2.666E-07	2.444E-07	2.055E-07	1.119E-07	1.972E-08	4.529E-11	1.307E-18	5.605E-45
Ac-227	Pa-231	1.376E-02	0.000E+00	5.809E-06	1.565E-05	3.620E-05	4.180E-05	1.034E-05	1.234E-07	2.281E-14
Ac-227	U-235	1.376E-02	0.000E+00	2.307E-12	1.905E-11	1.575E-10	6.430E-10	6.888E-10	2.768E-11	1.783E-17
Ac-227	ΣS(j):		9.659E-05	9.437E-05	9.010E-05	7.674E-05	4.894E-05	1.036E-05	1.234E-07	2.282E-14
0Ac-227	Ac-227	8.257E-07	5.780E-09	5.299E-09	4.455E-09	2.426E-09	4.275E-10	9.819E-13	2.834E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.600E-11	1.467E-11	1.233E-11	6.715E-12	1.183E-12	2.718E-15	7.843E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	0.000E+00	3.486E-10	9.391E-10	2.172E-09	2.508E-09	6.204E-10	7.406E-12	1.368E-18
Ac-227	U-235	8.257E-07	0.000E+00	1.384E-16	1.143E-15	9.448E-15	3.858E-14	4.133E-14	1.661E-15	1.070E-21
Ac-227	ΣS(j):		5.796E-09	5.663E-09	5.406E-09	4.605E-09	2.937E-09	6.215E-10	7.407E-12	1.370E-18
0Pa-231	Pa-231	9.835E-01	1.377E-02	1.347E-02	1.288E-02	1.103E-02	7.085E-03	1.503E-03	1.791E-05	3.310E-12
Pa-231	Pa-231	2.722E-03	3.811E-05	3.727E-05	3.566E-05	3.054E-05	1.961E-05	4.160E-06	4.958E-08	9.161E-15
Pa-231	U-235	9.835E-01	0.000E+00	1.058E-08	3.038E-08	8.672E-08	1.671E-07	1.183E-07	4.237E-09	2.629E-15
Pa-231	U-235	2.722E-03	0.000E+00	2.929E-11	8.407E-11	2.400E-10	4.624E-10	3.273E-10	1.173E-11	7.276E-18
Pa-231	U-235	1.376E-02	0.000E+00	1.481E-10	4.250E-10	1.213E-09	2.338E-09	1.655E-09	5.928E-11	3.679E-17
Pa-231	U-235	3.809E-05	0.000E+00	4.099E-13	1.176E-12	3.358E-12	6.470E-12	4.579E-12	1.641E-13	1.018E-19
Pa-231	U-235	8.257E-07	0.000E+00	8.886E-15	2.550E-14	7.281E-14	1.403E-13	9.928E-14	3.557E-15	2.207E-21
Pa-231	U-235	2.285E-09	0.000E+00	2.459E-17	7.058E-17	2.015E-16	3.883E-16	2.748E-16	9.845E-18	6.109E-24
Pa-231	ΣS(j):		1.381E-02	1.350E-02	1.292E-02	1.106E-02	7.104E-03	1.507E-03	1.797E-05	3.322E-12
0Ac-227	Pa-231	2.722E-03	0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.441E-08	4.511E-15
Ac-227	U-235	2.722E-03	0.000E+00	4.564E-13	3.767E-12	3.115E-11	1.272E-10	1.362E-10	5.475E-12	3.527E-18
Ac-227	ΣS(j):		0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.442E-08	4.514E-15
0Pa-231	Pa-231	1.376E-02	1.927E-04	1.884E-04	1.803E-04	1.544E-04	9.913E-05	2.103E-05	2.506E-07	4.632E-14
Pa-231	Pa-231	3.809E-05	5.332E-07	5.215E-07	4.989E-07	4.273E-07	2.744E-07	5.821E-08	6.937E-10	1.282E-16
Pa-231	ΣS(j):		1.932E-04	1.890E-04	1.808E-04	1.548E-04	9.941E-05	2.109E-05	2.513E-07	4.644E-14
0Ac-227	Pa-231	3.809E-05	0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.416E-10	6.312E-17
Ac-227	U-235	3.809E-05	0.000E+00	6.386E-15	5.271E-14	4.358E-13	1.779E-12	1.906E-12	7.661E-14	4.935E-20
Ac-227	ΣS(j):		0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.417E-10	6.317E-17
0Pa-231	Pa-231	8.257E-07	1.156E-08	1.131E-08	1.082E-08	9.263E-09	5.948E-09	1.262E-09	1.504E-11	2.779E-18
Pa-231	Pa-231	2.285E-09	3.199E-11	3.129E-11	2.994E-11	2.564E-11	1.646E-11	3.493E-12	4.162E-14	7.691E-21
Pa-231	ΣS(j):		1.159E-08	1.134E-08	1.085E-08	9.289E-09	5.965E-09	1.265E-09	1.508E-11	2.787E-18
0Ac-227	Pa-231	2.285E-09	0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.787E-21
Ac-227	U-235	2.285E-09	0.000E+00	3.832E-19	3.163E-18	2.615E-17	1.068E-16	1.144E-16	4.597E-18	2.961E-24
Ac-227	ΣS(j):		0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.790E-21
0Pb-210	Pb-210	1.000E+00	8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣS(j):		8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21
0Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06	0.000E+00	2.801E-10	7.926E-10	2.158E-09	3.686E-09	2.017E-09	8.428E-11	9.625E-16
Pb-210	Ra-226	2.771E-10	0.000E+00	5.883E-14	1.665E-13	4.532E-13	7.742E-13	4.237E-13	1.770E-14	2.022E-19
Pb-210	Ra-226	2.637E-10	0.000E+00	5.597E-14	1.584E-13	4.312E-13	7.366E-13	4.031E-13	1.684E-14	1.924E-19
Pb-210	Ra-226	5.538E-14	0.000E+00	1.176E-17	3.327E-17	9.057E-17	1.547E-16	8.467E-17	3.538E-18	4.040E-23
Pb-210	Ra-226	2.640E-13	0.000E+00	5.604E-17	1.586E-16	4.317E-16	7.375E-16	4.036E-16	1.686E-17	1.926E-22
Pb-210	Th-230	1.319E-06	0.000E+00	8.751E-12	7.577E-11	7.368E-10	4.622E-09	1.787E-08	2.547E-08	2.530E-08
Pb-210	Th-230	2.771E-10	0.000E+00	1.838E-15	1.591E-14	1.548E-13	9.708E-13	3.753E-12	5.350E-12	5.313E-12
Pb-210	Th-230	2.637E-10	0.000E+00	1.749E-15	1.514E-14	1.472E-13	9.236E-13	3.570E-12	5.090E-12	5.055E-12
Pb-210	Th-230	5.538E-14	0.000E+00	3.673E-19	3.180E-18	3.093E-17	1.940E-16	7.499E-16	1.069E-15	1.062E-15
Pb-210	Th-230	2.640E-13	0.000E+00	1.751E-18	1.516E-17	1.474E-16	9.247E-16	3.575E-15	5.096E-15	5.061E-15
Pb-210	U-234	1.319E-06	0.000E+00	3.217E-19	8.343E-18	2.689E-16	4.937E-15	5.437E-14	1.237E-13	1.263E-13
Pb-210	U-234	2.771E-10	0.000E+00	6.757E-23	1.752E-21	5.647E-20	1.037E-18	1.142E-17	2.598E-17	2.653E-17
Pb-210	U-234	2.637E-10	0.000E+00	6.428E-23	1.667E-21	5.373E-20	9.866E-19	1.087E-17	2.472E-17	2.524E-17
Pb-210	U-234	5.538E-14	0.000E+00	1.350E-26	3.502E-25	1.129E-23	2.072E-22	2.282E-21	5.192E-21	5.301E-21
Pb-210	U-234	2.640E-13	0.000E+00	6.436E-26	1.669E-24	5.379E-23	9.878E-22	1.088E-20	2.475E-20	2.527E-20
Pb-210	U-238	2.111E-09	0.000E+00	3.631E-28	2.823E-26	3.022E-24	1.642E-22	5.511E-21	2.374E-20	2.581E-20
Pb-210	U-238	4.434E-13	0.000E+00	7.628E-32	5.930E-30	6.348E-28	3.449E-26	1.158E-24	4.987E-24	5.422E-24
Pb-210	U-238	4.219E-13	0.000E+00	7.257E-32	5.642E-30	6.040E-28	3.282E-26	1.101E-24	4.745E-24	5.159E-24
Pb-210	U-238	8.862E-17	0.000E+00	1.524E-35	1.185E-33	1.269E-31	6.893E-30	2.313E-28	9.966E-28	1.084E-27
Pb-210	U-238	4.224E-16	0.000E+00	7.266E-35	5.649E-33	6.047E-31	3.286E-29	1.103E-27	4.751E-27	5.165E-27
Pb-210	U-238	1.317E-06	0.000E+00	2.266E-25	1.762E-23	1.886E-21	1.025E-19	3.439E-18	1.482E-17	1.611E-17
Pb-210	U-238	2.767E-10	0.000E+00	4.760E-29	3.700E-27	3.961E-25	2.152E-23	7.224E-22	3.112E-21	3.383E-21
Pb-210	U-238	2.633E-10	0.000E+00	4.528E-29	3.521E-27	3.769E-25	2.048E-23	6.873E-22	2.961E-21	3.219E-21
Pb-210	U-238	5.530E-14	0.000E+00	9.512E-33	7.395E-31	7.916E-29	4.301E-27	1.444E-25	6.219E-25	6.761E-25
Pb-210	U-238	2.636E-13	0.000E+00	4.534E-32	3.525E-30	3.773E-28	2.050E-26	6.881E-25	2.964E-24	3.223E-24
Pb-210	ΣS(j):		0.000E+00	2.889E-10	8.687E-10	2.896E-09	8.311E-09	1.989E-08	2.557E-08	2.531E-08
0Ra-226	Ra-226	9.996E-01	6.997E-03	6.884E-03	6.664E-03	5.947E-03	4.296E-03	1.377E-03	5.330E-05	6.084E-10
Ra-226	Ra-226	1.319E-06	9.236E-09	9.087E-09	8.797E-09	7.850E-09	5.671E-09	1.817E-09	7.035E-11	8.031E-16
Ra-226	Th-230	9.996E-01	0.000E+00	4.295E-04	1.268E-03	3.996E-03	1.028E-02	2.136E-02	2.626E-02	2.595E-02
Ra-226	Th-230	1.319E-06	0.000E+00	5.670E-10	1.674E-09	5.275E-09	1.356E-08	2.819E-08	3.466E-08	3.426E-08
Ra-226	Th-230	1.899E-08	0.000E+00	8.161E-12	2.409E-11	7.593E-11	1.953E-10	4.058E-10	4.989E-10	4.931E-10
Ra-226	U-234	9.996E-01	0.000E+00	2.359E-11	2.069E-10	2.104E-09	1.479E-08	7.445E-08	1.288E-07	1.296E-07
Ra-226	U-234	1.319E-06	0.000E+00	3.114E-17	2.732E-16	2.778E-15	1.952E-14	9.828E-14	1.700E-13	1.710E-13
Ra-226	U-234	1.899E-08	0.000E+00	4.482E-19	3.932E-18	3.998E-17	2.810E-16	1.415E-15	2.446E-15	2.462E-15
Ra-226	U-238	1.599E-03	0.000E+00	3.544E-20	9.283E-19	3.095E-17	6.215E-16	8.658E-15	2.519E-14	2.648E-14
Ra-226	U-238	2.111E-09	0.000E+00	4.678E-26	1.225E-24	4.085E-23	8.204E-22	1.143E-20	3.325E-20	3.496E-20
Ra-226	U-238	3.039E-11	0.000E+00	6.733E-28	1.764E-26	5.880E-25	1.181E-23	1.645E-22	4.785E-22	5.032E-22
Ra-226	U-238	9.980E-01	0.000E+00	2.211E-17	5.793E-16	1.931E-14	3.878E-13	5.403E-12	1.572E-11	1.653E-11
Ra-226	U-238	1.317E-06	0.000E+00	2.919E-23	7.646E-22	2.549E-20	5.120E-19	7.132E-18	2.075E-17	2.181E-17
Ra-226	U-238	1.896E-08	0.000E+00	4.201E-25	1.101E-23	3.669E-22	7.369E-21	1.027E-19	2.986E-19	3.140E-19
Ra-226	ΣS(j):		6.997E-03	7.314E-03	7.932E-03	9.943E-03	1.457E-02	2.273E-02	2.631E-02	2.595E-02
0Pb-210	Ra-226	9.996E-01	0.000E+00	2.122E-04	6.004E-04	1.635E-03	2.792E-03	1.528E-03	6.385E-05	7.292E-10

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	0.000E+00	4.457E-08	1.261E-07	3.434E-07	5.865E-07	3.210E-07	1.341E-08	1.532E-13
Pb-210	Ra-226	1.998E-04	0.000E+00	4.240E-08	1.200E-07	3.267E-07	5.580E-07	3.054E-07	1.276E-08	1.457E-13
Pb-210	Ra-226	4.196E-08	0.000E+00	8.906E-12	2.520E-11	6.862E-11	1.172E-10	6.414E-11	2.680E-12	3.061E-17
Pb-210	Ra-226	2.000E-07	0.000E+00	4.245E-11	1.201E-10	3.271E-10	5.587E-10	3.057E-10	1.278E-11	1.459E-16
Pb-210	Th-230	9.996E-01	0.000E+00	6.630E-06	5.740E-05	5.582E-04	3.501E-03	1.353E-02	1.930E-02	1.916E-02
Pb-210	Th-230	2.100E-04	0.000E+00	1.393E-09	1.206E-08	1.172E-07	7.354E-07	2.843E-06	4.053E-06	4.025E-06
Pb-210	Th-230	1.998E-04	0.000E+00	1.325E-09	1.147E-08	1.115E-07	6.997E-07	2.705E-06	3.856E-06	3.830E-06
Pb-210	Th-230	4.196E-08	0.000E+00	2.783E-13	2.409E-12	2.343E-11	1.470E-10	5.681E-10	8.099E-10	8.044E-10
Pb-210	Th-230	2.000E-07	0.000E+00	1.327E-12	1.148E-11	1.117E-10	7.005E-10	2.708E-09	3.861E-09	3.834E-09
Pb-210	U-234	9.996E-01	0.000E+00	2.437E-13	6.321E-12	2.037E-10	3.740E-09	4.119E-08	9.371E-08	9.567E-08
Pb-210	U-234	2.100E-04	0.000E+00	5.119E-17	1.328E-15	4.278E-14	7.856E-13	8.652E-12	1.968E-11	2.010E-11
Pb-210	U-234	1.998E-04	0.000E+00	4.870E-17	1.263E-15	4.070E-14	7.474E-13	8.231E-12	1.873E-11	1.912E-11
Pb-210	U-234	4.196E-08	0.000E+00	1.023E-20	2.653E-19	8.549E-18	1.570E-16	1.729E-15	3.934E-15	4.016E-15
Pb-210	U-234	2.000E-07	0.000E+00	4.876E-20	1.265E-18	4.075E-17	7.483E-16	8.241E-15	1.875E-14	1.914E-14
Pb-210	U-238	1.599E-03	0.000E+00	2.751E-22	2.139E-20	2.290E-18	1.244E-16	4.175E-15	1.799E-14	1.956E-14
Pb-210	U-238	3.359E-07	0.000E+00	5.779E-26	4.492E-24	4.809E-22	2.613E-20	8.770E-19	3.778E-18	4.108E-18
Pb-210	U-238	3.196E-07	0.000E+00	5.498E-26	4.274E-24	4.576E-22	2.486E-20	8.344E-19	3.595E-18	3.908E-18
Pb-210	U-238	6.713E-11	0.000E+00	1.155E-29	8.978E-28	9.611E-26	5.222E-24	1.753E-22	7.550E-22	8.209E-22
Pb-210	U-238	3.200E-10	0.000E+00	5.504E-29	4.279E-27	4.581E-25	2.489E-23	8.354E-22	3.599E-21	3.913E-21
Pb-210	U-238	9.980E-01	0.000E+00	1.717E-19	1.335E-17	1.429E-15	7.763E-14	2.605E-12	1.122E-11	1.220E-11
Pb-210	U-238	2.096E-04	0.000E+00	3.606E-23	2.803E-21	3.001E-19	1.631E-17	5.472E-16	2.358E-15	2.563E-15
Pb-210	U-238	1.994E-04	0.000E+00	3.431E-23	2.667E-21	2.855E-19	1.551E-17	5.207E-16	2.243E-15	2.439E-15
Pb-210	U-238	4.189E-08	0.000E+00	7.206E-27	5.602E-25	5.997E-23	3.259E-21	1.094E-19	4.711E-19	5.122E-19
Pb-210	U-238	1.997E-07	0.000E+00	3.435E-26	2.670E-24	2.859E-22	1.553E-20	5.213E-19	2.246E-18	2.442E-18
Pb-210	ΣS(j):		0.000E+00	2.189E-04	6.581E-04	2.194E-03	6.296E-03	1.507E-02	1.937E-02	1.917E-02
0Ra-226	Ra-226	1.899E-08	1.329E-10	1.308E-10	1.266E-10	1.130E-10	8.163E-11	2.616E-11	1.013E-12	1.156E-17
Ra-226	Ra-226	2.100E-04	1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.024E-07	2.892E-07	1.119E-08	1.278E-13
Ra-226	ΣS(j):		1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.025E-07	2.892E-07	1.120E-08	1.278E-13
0Pb-210	Ra-226	1.899E-08	0.000E+00	4.031E-12	1.141E-11	3.106E-11	5.306E-11	2.903E-11	1.213E-12	1.385E-17
Pb-210	Ra-226	3.989E-12	0.000E+00	8.467E-16	2.396E-15	6.524E-15	1.114E-14	6.098E-15	2.548E-16	2.910E-21
Pb-210	Ra-226	3.795E-12	0.000E+00	8.056E-16	2.280E-15	6.207E-15	1.060E-14	5.802E-15	2.424E-16	2.769E-21
Pb-210	Ra-226	7.972E-16	0.000E+00	1.692E-19	4.789E-19	1.304E-18	2.227E-18	1.219E-18	5.092E-20	5.816E-25
Pb-210	Ra-226	3.800E-15	0.000E+00	8.066E-19	2.283E-18	6.214E-18	1.062E-17	5.809E-18	2.427E-19	2.772E-24
Pb-210	Th-230	1.899E-08	0.000E+00	1.260E-13	1.091E-12	1.061E-11	6.652E-11	2.572E-10	3.666E-10	3.641E-10
Pb-210	Th-230	3.989E-12	0.000E+00	2.646E-17	2.291E-16	2.228E-15	1.397E-14	5.401E-14	7.701E-14	7.648E-14
Pb-210	Th-230	3.795E-12	0.000E+00	2.517E-17	2.179E-16	2.119E-15	1.329E-14	5.139E-14	7.326E-14	7.276E-14
Pb-210	Th-230	7.972E-16	0.000E+00	5.287E-21	4.578E-20	4.452E-19	2.792E-18	1.079E-17	1.539E-17	1.528E-17
Pb-210	Th-230	3.800E-15	0.000E+00	2.520E-20	2.182E-19	2.122E-18	1.331E-17	5.145E-17	7.335E-17	7.285E-17
Pb-210	U-234	1.899E-08	0.000E+00	4.630E-21	1.201E-19	3.870E-18	7.106E-17	7.826E-16	1.781E-15	1.818E-15
Pb-210	U-234	3.989E-12	0.000E+00	9.725E-25	2.522E-23	8.128E-22	1.493E-20	1.644E-19	3.740E-19	3.818E-19
Pb-210	U-234	3.795E-12	0.000E+00	9.253E-25	2.400E-23	7.734E-22	1.420E-20	1.564E-19	3.558E-19	3.633E-19
Pb-210	U-234	7.972E-16	0.000E+00	1.944E-28	5.041E-27	1.624E-25	2.983E-24	3.285E-23	7.474E-23	7.630E-23
Pb-210	U-234	3.800E-15	0.000E+00	9.264E-28	2.403E-26	7.743E-25	1.422E-23	1.566E-22	3.563E-22	3.637E-22
Pb-210	U-238	3.039E-11	0.000E+00	5.227E-30	4.064E-28	4.350E-26	2.364E-24	7.933E-23	3.418E-22	3.716E-22
Pb-210	U-238	6.383E-15	0.000E+00	1.098E-33	8.536E-32	9.137E-30	4.965E-28	1.666E-26	7.178E-26	7.805E-26
Pb-210	U-238	6.073E-15	0.000E+00	1.045E-33	8.121E-32	8.694E-30	4.724E-28	1.585E-26	6.830E-26	7.426E-26
Pb-210	U-238	1.276E-18	0.000E+00	2.194E-37	1.706E-35	1.826E-33	9.922E-32	3.330E-30	1.435E-29	1.560E-29

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	1.046E-36	8.131E-35	8.704E-33	4.730E-31	1.587E-29	6.838E-29	7.435E-29
Pb-210	U-238	1.896E-08	0.000E+00	3.262E-27	2.536E-25	2.715E-23	1.475E-21	4.950E-20	2.133E-19	2.319E-19
Pb-210	U-238	3.983E-12	0.000E+00	6.851E-31	5.326E-29	5.702E-27	3.098E-25	1.040E-23	4.479E-23	4.870E-23
Pb-210	U-238	3.789E-12	0.000E+00	6.518E-31	5.068E-29	5.425E-27	2.948E-25	9.893E-24	4.262E-23	4.634E-23
Pb-210	U-238	7.959E-16	0.000E+00	1.369E-34	1.064E-32	1.139E-30	6.191E-29	2.078E-27	8.951E-27	9.732E-27
Pb-210	U-238	3.794E-15	0.000E+00	6.526E-34	5.074E-32	5.431E-30	2.951E-28	9.904E-27	4.267E-26	4.639E-26
Pb-210	ΣS(j):		0.000E+00	4.159E-12	1.250E-11	4.168E-11	1.196E-10	2.863E-10	3.680E-10	3.643E-10
0Ra-226	Ra-226	2.771E-10	1.940E-12	1.909E-12	1.848E-12	1.649E-12	1.191E-12	3.817E-13	1.478E-14	1.687E-19
Ra-226	Ra-226	3.989E-12	2.792E-14	2.747E-14	2.660E-14	2.373E-14	1.715E-14	5.494E-15	2.127E-16	2.428E-21
Ra-226	ΣS(j):		1.968E-12	1.936E-12	1.874E-12	1.673E-12	1.208E-12	3.872E-13	1.499E-14	1.711E-19
0Ra-226	Ra-226	1.998E-04	1.398E-06	1.376E-06	1.332E-06	1.188E-06	8.586E-07	2.751E-07	1.065E-08	1.216E-13
Ra-226	Ra-226	2.637E-10	1.846E-12	1.816E-12	1.758E-12	1.569E-12	1.133E-12	3.632E-13	1.406E-14	1.605E-19
Ra-226	Th-230	1.998E-04	0.000E+00	8.584E-08	2.534E-07	7.986E-07	2.054E-06	4.268E-06	5.247E-06	5.186E-06
Ra-226	Th-230	2.637E-10	0.000E+00	1.133E-13	3.345E-13	1.054E-12	2.711E-12	5.634E-12	6.926E-12	6.846E-12
Ra-226	Th-230	3.795E-12	0.000E+00	1.631E-15	4.814E-15	1.517E-14	3.902E-14	8.109E-14	9.970E-14	9.854E-14
Ra-226	U-234	1.998E-04	0.000E+00	4.714E-15	4.136E-14	4.205E-13	2.956E-12	1.488E-11	2.573E-11	2.589E-11
Ra-226	U-234	2.637E-10	0.000E+00	6.222E-21	5.459E-20	5.551E-19	3.902E-18	1.964E-17	3.397E-17	3.418E-17
Ra-226	U-234	3.795E-12	0.000E+00	8.956E-23	7.858E-22	7.990E-21	5.616E-20	2.827E-19	4.889E-19	4.919E-19
Ra-226	U-238	3.196E-07	0.000E+00	7.082E-24	1.855E-22	6.185E-21	1.242E-19	1.730E-18	5.033E-18	5.293E-18
Ra-226	U-238	4.219E-13	0.000E+00	9.348E-30	2.449E-28	8.164E-27	1.640E-25	2.284E-24	6.644E-24	6.986E-24
Ra-226	U-238	6.073E-15	0.000E+00	1.346E-31	3.525E-30	1.175E-28	2.360E-27	3.288E-26	9.563E-26	1.006E-25
Ra-226	U-238	1.994E-04	0.000E+00	4.419E-21	1.158E-19	3.859E-18	7.751E-17	1.080E-15	3.141E-15	3.303E-15
Ra-226	U-238	2.633E-10	0.000E+00	5.833E-27	1.528E-25	5.094E-24	1.023E-22	1.425E-21	4.146E-21	4.359E-21
Ra-226	U-238	3.789E-12	0.000E+00	8.396E-29	2.199E-27	7.333E-26	1.473E-24	2.051E-23	5.967E-23	6.275E-23
Ra-226	ΣS(j):		1.398E-06	1.462E-06	1.585E-06	1.987E-06	2.912E-06	4.543E-06	5.258E-06	5.186E-06
0Ra-226	Ra-226	3.795E-12	2.657E-14	2.614E-14	2.530E-14	2.258E-14	1.631E-14	5.227E-15	2.024E-16	2.310E-21
Ra-226	Ra-226	4.196E-08	2.937E-10	2.890E-10	2.797E-10	2.496E-10	1.803E-10	5.779E-11	2.237E-12	2.554E-17
Ra-226	ΣS(j):		2.937E-10	2.890E-10	2.797E-10	2.497E-10	1.804E-10	5.779E-11	2.237E-12	2.554E-17
0Ra-226	Ra-226	5.538E-14	3.877E-16	3.814E-16	3.692E-16	3.295E-16	2.380E-16	7.628E-17	2.953E-18	3.371E-23
Ra-226	Ra-226	7.972E-16	5.580E-18	5.490E-18	5.315E-18	4.743E-18	3.426E-18	1.098E-18	4.251E-20	4.852E-25
Ra-226	ΣS(j):		3.933E-16	3.869E-16	3.746E-16	3.343E-16	2.415E-16	7.738E-17	2.996E-18	3.420E-23
0Ra-226	Ra-226	2.000E-07	1.400E-09	1.377E-09	1.333E-09	1.190E-09	8.596E-10	2.755E-10	1.066E-11	1.217E-16
Ra-226	Ra-226	2.640E-13	1.848E-15	1.818E-15	1.760E-15	1.571E-15	1.135E-15	3.636E-16	1.408E-17	1.607E-22
Ra-226	Th-230	2.000E-07	0.000E+00	8.594E-11	2.537E-10	7.996E-10	2.056E-09	4.273E-09	5.254E-09	5.192E-09
Ra-226	Th-230	2.640E-13	0.000E+00	1.134E-16	3.349E-16	1.055E-15	2.714E-15	5.641E-15	6.935E-15	6.854E-15
Ra-226	Th-230	3.800E-15	0.000E+00	1.633E-18	4.820E-18	1.519E-17	3.907E-17	8.119E-17	9.982E-17	9.866E-17
Ra-226	U-234	2.000E-07	0.000E+00	4.720E-18	4.141E-17	4.210E-16	2.959E-15	1.490E-14	2.576E-14	2.592E-14
Ra-226	U-234	2.640E-13	0.000E+00	6.230E-24	5.466E-23	5.558E-22	3.906E-21	1.966E-20	3.401E-20	3.422E-20
Ra-226	U-234	3.800E-15	0.000E+00	8.967E-26	7.867E-25	8.000E-24	5.623E-23	2.830E-22	4.895E-22	4.925E-22
Ra-226	U-238	3.200E-10	0.000E+00	7.090E-27	1.857E-25	6.192E-24	1.244E-22	1.732E-21	5.039E-21	5.299E-21
Ra-226	U-238	4.224E-16	0.000E+00	9.359E-33	2.452E-31	8.174E-30	1.642E-28	2.287E-27	6.652E-27	6.995E-27
Ra-226	U-238	6.080E-18	0.000E+00	1.347E-34	3.529E-33	1.177E-31	2.363E-30	3.292E-29	9.575E-29	1.007E-28
Ra-226	U-238	1.997E-07	0.000E+00	4.424E-24	1.159E-22	3.864E-21	7.760E-20	1.081E-18	3.145E-18	3.307E-18
Ra-226	U-238	2.636E-13	0.000E+00	5.840E-30	1.530E-28	5.100E-27	1.024E-25	1.427E-24	4.151E-24	4.365E-24

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	8.406E-32	2.202E-30	7.342E-29	1.474E-27	2.054E-26	5.975E-26	6.282E-26
Ra-226	ΣS(j):		1.400E-09	1.463E-09	1.587E-09	1.989E-09	2.916E-09	4.549E-09	5.264E-09	5.193E-09
0Ra-226	Ra-226	3.800E-15	2.660E-17	2.617E-17	2.533E-17	2.261E-17	1.633E-17	5.234E-18	2.026E-19	2.313E-24
0Ra-228	Ra-228	1.000E+00	3.600E-04	3.141E-04	2.391E-04	9.205E-05	6.019E-06	4.303E-10	6.146E-22	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	1.127E-04	2.968E-04	6.579E-04	8.688E-04	8.824E-04	8.792E-04	8.679E-04
Ra-228	ΣS(j):		3.600E-04	4.268E-04	5.359E-04	7.499E-04	8.748E-04	8.824E-04	8.792E-04	8.679E-04
0Th-228	Ra-228	1.000E+00	0.000E+00	1.019E-04	1.888E-04	1.322E-04	9.636E-06	6.896E-10	9.851E-22	0.000E+00
Th-228	Th-228	1.000E+00	1.000E-03	6.959E-04	3.369E-04	2.662E-05	1.886E-08	1.785E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	1.856E-05	1.224E-04	5.358E-04	8.599E-04	8.824E-04	8.792E-04	8.679E-04
Th-228	ΣS(j):		1.000E-03	8.163E-04	6.482E-04	6.946E-04	8.696E-04	8.824E-04	8.792E-04	8.679E-04
0Th-230	Th-230	9.996E-01	9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
Th-230	Th-230	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.318E-06	1.316E-06	1.309E-06	1.283E-06
Th-230	U-234	9.996E-01	0.000E+00	1.091E-07	3.201E-07	9.893E-07	2.417E-06	4.431E-06	4.942E-06	4.854E-06
Th-230	U-234	1.319E-06	0.000E+00	1.440E-13	4.226E-13	1.306E-12	3.190E-12	5.849E-12	6.524E-12	6.407E-12
Th-230	U-234	1.899E-08	0.000E+00	2.073E-15	6.083E-15	1.880E-14	4.592E-14	8.418E-14	9.391E-14	9.222E-14
Th-230	U-234	2.100E-04	0.000E+00	2.291E-11	6.724E-11	2.078E-10	5.077E-10	9.306E-10	1.038E-09	1.020E-09
Th-230	U-234	2.771E-10	0.000E+00	3.025E-17	8.876E-17	2.743E-16	6.701E-16	1.228E-15	1.370E-15	1.346E-15
Th-230	U-234	3.989E-12	0.000E+00	4.353E-19	1.278E-18	3.948E-18	9.646E-18	1.768E-17	1.972E-17	1.937E-17
Th-230	U-234	1.998E-04	0.000E+00	2.180E-11	6.398E-11	1.977E-10	4.830E-10	8.854E-10	9.877E-10	9.700E-10
Th-230	U-234	2.637E-10	0.000E+00	2.878E-17	8.445E-17	2.610E-16	6.376E-16	1.169E-15	1.304E-15	1.280E-15
Th-230	U-234	3.795E-12	0.000E+00	4.142E-19	1.216E-18	3.756E-18	9.177E-18	1.682E-17	1.877E-17	1.843E-17
Th-230	U-234	4.196E-08	0.000E+00	4.579E-15	1.344E-14	4.153E-14	1.015E-13	1.860E-13	2.075E-13	2.037E-13
Th-230	U-234	5.538E-14	0.000E+00	6.044E-21	1.774E-20	5.482E-20	1.339E-19	2.455E-19	2.738E-19	2.689E-19
Th-230	U-234	7.972E-16	0.000E+00	8.700E-23	2.553E-22	7.890E-22	1.928E-21	3.534E-21	3.942E-21	3.871E-21
Th-230	U-234	2.000E-07	0.000E+00	2.183E-14	6.405E-14	1.979E-13	4.836E-13	8.865E-13	9.889E-13	9.712E-13
Th-230	U-234	2.640E-13	0.000E+00	2.881E-20	8.455E-20	2.613E-19	6.383E-19	1.170E-18	1.305E-18	1.282E-18
Th-230	U-234	3.800E-15	0.000E+00	4.147E-22	1.217E-21	3.761E-21	9.188E-21	1.684E-20	1.879E-20	1.845E-20
Th-230	U-238	1.599E-03	0.000E+00	2.455E-16	2.145E-15	2.152E-14	1.458E-13	6.591E-13	1.001E-12	9.922E-13
Th-230	U-238	2.111E-09	0.000E+00	3.240E-22	2.832E-21	2.841E-20	1.925E-19	8.700E-19	1.322E-18	1.310E-18
Th-230	U-238	3.039E-11	0.000E+00	4.664E-24	4.076E-23	4.090E-22	2.770E-21	1.252E-20	1.903E-20	1.885E-20
Th-230	U-238	3.359E-07	0.000E+00	5.156E-20	4.506E-19	4.521E-18	3.063E-17	1.384E-16	2.103E-16	2.084E-16
Th-230	U-238	4.434E-13	0.000E+00	6.806E-26	5.948E-25	5.968E-24	4.043E-23	1.827E-22	2.777E-22	2.751E-22
Th-230	U-238	6.383E-15	0.000E+00	9.797E-28	8.562E-27	8.590E-26	5.819E-25	2.630E-24	3.997E-24	3.960E-24
Th-230	U-238	3.196E-07	0.000E+00	4.906E-20	4.287E-19	4.301E-18	2.914E-17	1.317E-16	2.001E-16	1.983E-16
Th-230	U-238	4.219E-13	0.000E+00	6.476E-26	5.659E-25	5.678E-24	3.846E-23	1.739E-22	2.642E-22	2.617E-22
Th-230	U-238	6.073E-15	0.000E+00	9.321E-28	8.146E-27	8.173E-26	5.537E-25	2.502E-24	3.802E-24	3.767E-24
Th-230	U-238	6.713E-11	0.000E+00	1.030E-23	9.005E-23	9.035E-22	6.121E-21	2.766E-20	4.204E-20	4.165E-20
Th-230	U-238	8.862E-17	0.000E+00	1.360E-29	1.189E-28	1.193E-27	8.079E-27	3.652E-26	5.549E-26	5.497E-26
Th-230	U-238	1.276E-18	0.000E+00	1.958E-31	1.711E-30	1.717E-29	1.163E-28	5.256E-28	7.987E-28	7.913E-28
Th-230	U-238	3.200E-10	0.000E+00	4.912E-23	4.292E-22	4.307E-21	2.917E-20	1.319E-19	2.004E-19	1.985E-19
Th-230	U-238	4.224E-16	0.000E+00	6.484E-29	5.666E-28	5.685E-27	3.851E-26	1.741E-25	2.645E-25	2.620E-25
Th-230	U-238	6.080E-18	0.000E+00	9.332E-31	8.156E-30	8.182E-29	5.543E-28	2.505E-27	3.807E-27	3.772E-27
Th-230	U-238	9.980E-01	0.000E+00	1.532E-13	1.339E-12	1.343E-11	9.099E-11	4.113E-10	6.249E-10	6.191E-10
Th-230	U-238	1.317E-06	0.000E+00	2.022E-19	1.767E-18	1.773E-17	1.201E-16	5.429E-16	8.249E-16	8.173E-16
Th-230	U-238	1.896E-08	0.000E+00	2.911E-21	2.544E-20	2.552E-19	1.729E-18	7.814E-18	1.187E-17	1.176E-17

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	0.000E+00	3.218E-17	2.812E-16	2.821E-15	1.911E-14	8.638E-14	1.313E-13	1.300E-13
Th-230	U-238	2.767E-10	0.000E+00	4.247E-23	3.712E-22	3.724E-21	2.523E-20	1.140E-19	1.733E-19	1.717E-19
Th-230	U-238	3.983E-12	0.000E+00	6.113E-25	5.343E-24	5.360E-23	3.631E-22	1.641E-21	2.494E-21	2.471E-21
Th-230	U-238	1.994E-04	0.000E+00	3.061E-17	2.675E-16	2.684E-15	1.818E-14	8.219E-14	1.249E-13	1.237E-13
Th-230	U-238	2.633E-10	0.000E+00	4.041E-23	3.531E-22	3.543E-21	2.400E-20	1.085E-19	1.648E-19	1.633E-19
Th-230	U-238	3.789E-12	0.000E+00	5.816E-25	5.083E-24	5.100E-23	3.455E-22	1.562E-21	2.373E-21	2.351E-21
Th-230	U-238	4.189E-08	0.000E+00	6.430E-21	5.619E-20	5.638E-19	3.819E-18	1.726E-17	2.623E-17	2.599E-17
Th-230	U-238	5.530E-14	0.000E+00	8.488E-27	7.417E-26	7.442E-25	5.041E-24	2.279E-23	3.462E-23	3.430E-23
Th-230	U-238	7.959E-16	0.000E+00	1.222E-28	1.068E-27	1.071E-26	7.257E-26	3.280E-25	4.984E-25	4.938E-25
Th-230	U-238	1.997E-07	0.000E+00	3.065E-20	2.678E-19	2.687E-18	1.821E-17	8.229E-17	1.250E-16	1.239E-16
Th-230	U-238	2.636E-13	0.000E+00	4.046E-26	3.536E-25	3.547E-24	2.403E-23	1.086E-22	1.650E-22	1.635E-22
Th-230	U-238	3.794E-15	0.000E+00	5.823E-28	5.089E-27	5.106E-26	3.459E-25	1.563E-24	2.376E-24	2.354E-24
Th-230	ΣS(j):		9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
0Th-230	Th-230	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.898E-08	1.894E-08	1.883E-08	1.847E-08
Th-230	Th-230	2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
Th-230	ΣS(j):		2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
0Ra-226	Th-230	2.100E-04	0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
Ra-226	Th-230	3.989E-12	0.000E+00	1.714E-15	5.060E-15	1.595E-14	4.101E-14	8.523E-14	1.048E-13	1.036E-13
Ra-226	U-234	2.100E-04	0.000E+00	4.955E-15	4.347E-14	4.420E-13	3.107E-12	1.564E-11	2.705E-11	2.721E-11
Ra-226	U-234	2.771E-10	0.000E+00	6.540E-21	5.738E-20	5.834E-19	4.101E-18	2.064E-17	3.570E-17	3.592E-17
Ra-226	U-234	3.989E-12	0.000E+00	9.414E-23	8.259E-22	8.398E-21	5.903E-20	2.971E-19	5.139E-19	5.171E-19
Ra-226	U-238	3.359E-07	0.000E+00	7.443E-24	1.950E-22	6.501E-21	1.306E-19	1.819E-18	5.290E-18	5.563E-18
Ra-226	U-238	4.434E-13	0.000E+00	9.825E-30	2.574E-28	8.581E-27	1.723E-25	2.401E-24	6.983E-24	7.343E-24
Ra-226	U-238	6.383E-15	0.000E+00	1.414E-31	3.705E-30	1.235E-28	2.480E-27	3.455E-26	1.005E-25	1.057E-25
Ra-226	U-238	2.096E-04	0.000E+00	4.645E-21	1.217E-19	4.056E-18	8.146E-17	1.135E-15	3.301E-15	3.471E-15
Ra-226	U-238	2.767E-10	0.000E+00	6.131E-27	1.606E-25	5.354E-24	1.075E-22	1.498E-21	4.357E-21	4.582E-21
Ra-226	U-238	3.983E-12	0.000E+00	8.825E-29	2.312E-27	7.707E-26	1.548E-24	2.156E-23	6.272E-23	6.595E-23
Ra-226	ΣS(j):		0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
0Th-230	Th-230	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.769E-10	2.764E-10	2.748E-10	2.696E-10
Th-230	Th-230	3.989E-12	3.989E-12	3.989E-12	3.989E-12	3.988E-12	3.986E-12	3.978E-12	3.956E-12	3.880E-12
Th-230	ΣS(j):		2.811E-10	2.811E-10	2.811E-10	2.811E-10	2.809E-10	2.804E-10	2.788E-10	2.734E-10
0Ra-226	Th-230	2.771E-10	0.000E+00	1.191E-13	3.515E-13	1.108E-12	2.849E-12	5.922E-12	7.280E-12	7.195E-12
0Th-230	Th-230	1.998E-04	1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
Th-230	Th-230	2.637E-10	2.637E-10	2.637E-10	2.637E-10	2.636E-10	2.635E-10	2.630E-10	2.615E-10	2.565E-10
Th-230	ΣS(j):		1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
0Th-230	Th-230	3.795E-12	3.795E-12	3.795E-12	3.795E-12	3.794E-12	3.792E-12	3.785E-12	3.764E-12	3.692E-12
Th-230	Th-230	4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.195E-08	4.192E-08	4.184E-08	4.161E-08	4.081E-08
Th-230	ΣS(j):		4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.193E-08	4.185E-08	4.161E-08	4.081E-08
0Ra-226	Th-230	4.196E-08	0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
Ra-226	Th-230	7.972E-16	0.000E+00	3.426E-19	1.011E-18	3.187E-18	8.196E-18	1.703E-17	2.094E-17	2.070E-17
Ra-226	U-234	4.196E-08	0.000E+00	9.901E-19	8.686E-18	8.833E-17	6.209E-16	3.125E-15	5.405E-15	5.438E-15
Ra-226	U-234	5.538E-14	0.000E+00	1.307E-24	1.147E-23	1.166E-22	8.195E-22	4.125E-21	7.134E-21	7.179E-21

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	0.000E+00	1.881E-26	1.650E-25	1.678E-24	1.180E-23	5.938E-23	1.027E-22	1.033E-22
Ra-226	U-238	6.713E-11	0.000E+00	1.487E-27	3.897E-26	1.299E-24	2.609E-23	3.634E-22	1.057E-21	1.112E-21
Ra-226	U-238	8.862E-17	0.000E+00	1.963E-33	5.144E-32	1.715E-30	3.444E-29	4.797E-28	1.395E-27	1.467E-27
Ra-226	U-238	1.276E-18	0.000E+00	2.826E-35	7.404E-34	2.468E-32	4.957E-31	6.905E-30	2.009E-29	2.112E-29
Ra-226	U-238	4.189E-08	0.000E+00	9.282E-25	2.431E-23	8.106E-22	1.628E-20	2.268E-19	6.597E-19	6.937E-19
Ra-226	U-238	5.530E-14	0.000E+00	1.225E-30	3.210E-29	1.070E-27	2.149E-26	2.994E-25	8.708E-25	9.157E-25
Ra-226	U-238	7.959E-16	0.000E+00	1.764E-32	4.620E-31	1.540E-29	3.093E-28	4.309E-27	1.253E-26	1.318E-26
Ra-226	ΣS(j):		0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
0Th-230	Th-230	5.538E-14	5.538E-14	5.538E-14	5.538E-14	5.537E-14	5.534E-14	5.523E-14	5.493E-14	5.387E-14
Th-230	Th-230	7.972E-16	7.972E-16	7.972E-16	7.971E-16	7.970E-16	7.965E-16	7.950E-16	7.906E-16	7.754E-16
Th-230	ΣS(j):		5.618E-14	5.618E-14	5.618E-14	5.617E-14	5.614E-14	5.603E-14	5.572E-14	5.465E-14
0Ra-226	Th-230	5.538E-14	0.000E+00	2.380E-17	7.025E-17	2.214E-16	5.694E-16	1.183E-15	1.455E-15	1.438E-15
0Th-230	Th-230	2.000E-07	2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
Th-230	Th-230	2.640E-13	2.640E-13	2.640E-13	2.640E-13	2.639E-13	2.638E-13	2.633E-13	2.618E-13	2.568E-13
Th-230	ΣS(j):		2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
0Th-230	Th-230	3.800E-15	3.800E-15	3.800E-15	3.800E-15	3.799E-15	3.797E-15	3.789E-15	3.769E-15	3.696E-15
0Th-232	Th-232	1.000E+00	1.000E-03	1.000E-03	9.999E-04	9.998E-04	9.994E-04	9.981E-04	9.945E-04	9.817E-04
0U-234	U-234	9.996E-01	1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.175E-03	1.312E-03	1.569E-05	2.937E-12
U-234	U-234	1.319E-06	1.583E-08	1.549E-08	1.482E-08	1.269E-08	8.152E-09	1.732E-09	2.071E-11	3.877E-18
U-234	U-238	1.599E-03	0.000E+00	5.300E-11	1.521E-10	4.343E-10	8.370E-10	5.927E-10	2.128E-11	1.329E-17
U-234	U-238	2.111E-09	0.000E+00	6.996E-17	2.008E-16	5.733E-16	1.105E-15	7.824E-16	2.808E-17	1.754E-23
U-234	U-238	3.039E-11	0.000E+00	1.007E-18	2.890E-18	8.252E-18	1.590E-17	1.126E-17	4.042E-19	2.524E-25
U-234	U-238	3.359E-07	0.000E+00	1.113E-14	3.195E-14	9.122E-14	1.758E-13	1.245E-13	4.469E-15	2.791E-21
U-234	U-238	4.434E-13	0.000E+00	1.470E-20	4.218E-20	1.204E-19	2.321E-19	1.643E-19	5.899E-21	3.684E-27
U-234	U-238	6.383E-15	0.000E+00	2.115E-22	6.071E-22	1.733E-21	3.340E-21	2.365E-21	8.491E-23	5.302E-29
U-234	U-238	3.196E-07	0.000E+00	1.059E-14	3.040E-14	8.679E-14	1.673E-13	1.184E-13	4.252E-15	2.655E-21
U-234	U-238	4.219E-13	0.000E+00	1.398E-20	4.013E-20	1.146E-19	2.208E-19	1.564E-19	5.612E-21	3.505E-27
U-234	U-238	6.073E-15	0.000E+00	2.012E-22	5.776E-22	1.649E-21	3.178E-21	2.251E-21	8.078E-23	5.045E-29
U-234	U-238	6.713E-11	0.000E+00	2.225E-18	6.385E-18	1.823E-17	3.513E-17	2.488E-17	8.930E-19	5.577E-25
U-234	U-238	8.862E-17	0.000E+00	2.937E-24	8.429E-24	2.406E-23	4.637E-23	3.284E-23	1.179E-24	7.362E-31
U-234	U-238	1.276E-18	0.000E+00	4.227E-26	1.213E-25	3.464E-25	6.675E-25	4.727E-25	1.697E-26	1.060E-32
U-234	U-238	3.200E-10	0.000E+00	1.060E-17	3.044E-17	8.690E-17	1.675E-16	1.186E-16	4.257E-18	2.658E-24
U-234	U-238	4.224E-16	0.000E+00	1.400E-23	4.018E-23	1.147E-22	2.210E-22	1.565E-22	5.619E-24	3.509E-30
U-234	U-238	6.080E-18	0.000E+00	2.015E-25	5.783E-25	1.651E-24	3.182E-24	2.253E-24	8.088E-26	5.051E-32
U-234	U-238	9.980E-01	0.000E+00	3.307E-08	9.492E-08	2.710E-07	5.223E-07	3.699E-07	1.328E-08	8.291E-15
U-234	U-238	1.317E-06	0.000E+00	4.366E-14	1.253E-13	3.577E-13	6.894E-13	4.882E-13	1.752E-14	1.094E-20
U-234	U-238	1.896E-08	0.000E+00	6.284E-16	1.804E-15	5.149E-15	9.923E-15	7.027E-15	2.522E-16	1.575E-22
U-234	U-238	2.096E-04	0.000E+00	6.947E-12	1.994E-11	5.692E-11	1.097E-10	7.769E-11	2.788E-12	1.741E-18
U-234	U-238	2.767E-10	0.000E+00	9.170E-18	2.632E-17	7.514E-17	1.448E-16	1.025E-16	3.681E-18	2.299E-24
U-234	U-238	3.983E-12	0.000E+00	1.320E-19	3.788E-19	1.082E-18	2.084E-18	1.476E-18	5.298E-20	3.309E-26
U-234	U-238	1.994E-04	0.000E+00	6.609E-12	1.897E-11	5.416E-11	1.044E-10	7.391E-11	2.653E-12	1.657E-18
U-234	U-238	2.633E-10	0.000E+00	8.724E-18	2.504E-17	7.149E-17	1.378E-16	9.756E-17	3.502E-18	2.187E-24
U-234	U-238	3.789E-12	0.000E+00	1.256E-19	3.604E-19	1.029E-18	1.983E-18	1.404E-18	5.041E-20	3.148E-26

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	0.000E+00	1.388E-15	3.984E-15	1.138E-14	2.192E-14	1.552E-14	5.573E-16	3.480E-22
U-234	U-238	5.530E-14	0.000E+00	1.832E-21	5.259E-21	1.502E-20	2.894E-20	2.049E-20	7.356E-22	4.594E-28
U-234	U-238	7.959E-16	0.000E+00	2.638E-23	7.570E-23	2.161E-22	4.165E-22	2.950E-22	1.059E-23	6.612E-30
U-234	U-238	1.997E-07	0.000E+00	6.617E-15	1.899E-14	5.422E-14	1.045E-13	7.400E-14	2.656E-15	1.659E-21
U-234	U-238	2.636E-13	0.000E+00	8.735E-21	2.507E-20	7.157E-20	1.379E-19	9.768E-20	3.506E-21	2.190E-27
U-234	U-238	3.794E-15	0.000E+00	1.257E-22	3.609E-22	1.030E-21	1.985E-21	1.406E-21	5.047E-23	3.152E-29
U-234	ΣS(j):		1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.176E-03	1.312E-03	1.571E-05	2.945E-12
0U-234	U-234	1.899E-08	2.279E-10	2.229E-10	2.133E-10	1.827E-10	1.173E-10	2.493E-11	2.981E-13	5.580E-20
U-234	U-234	2.100E-04	2.519E-06	2.464E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.169E-16
U-234	ΣS(j):		2.520E-06	2.465E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.170E-16
0U-234	U-234	2.771E-10	3.326E-12	3.253E-12	3.112E-12	2.665E-12	1.712E-12	3.637E-13	4.351E-15	8.143E-22
U-234	U-234	3.989E-12	4.787E-14	4.682E-14	4.480E-14	3.837E-14	2.465E-14	5.235E-15	6.262E-17	1.172E-23
U-234	ΣS(j):		3.374E-12	3.300E-12	3.157E-12	2.704E-12	1.737E-12	3.690E-13	4.413E-15	8.260E-22
0U-234	U-234	1.998E-04	2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
U-234	U-234	2.637E-10	3.164E-12	3.095E-12	2.961E-12	2.536E-12	1.629E-12	3.461E-13	4.139E-15	7.748E-22
U-234	ΣS(j):		2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
0U-234	U-234	3.795E-12	4.554E-14	4.455E-14	4.262E-14	3.650E-14	2.345E-14	4.981E-15	5.958E-17	1.115E-23
U-234	U-234	4.196E-08	5.035E-10	4.925E-10	4.712E-10	4.035E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
U-234	ΣS(j):		5.035E-10	4.925E-10	4.712E-10	4.036E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
0U-234	U-234	5.538E-14	6.646E-16	6.501E-16	6.219E-16	5.327E-16	3.422E-16	7.269E-17	8.694E-19	1.627E-25
U-234	U-234	7.972E-16	9.566E-18	9.357E-18	8.952E-18	7.667E-18	4.925E-18	1.046E-18	1.251E-20	2.342E-27
U-234	ΣS(j):		6.742E-16	6.594E-16	6.309E-16	5.403E-16	3.471E-16	7.373E-17	8.820E-19	1.651E-25
0U-234	U-234	2.000E-07	2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
U-234	U-234	2.640E-13	3.168E-15	3.099E-15	2.965E-15	2.539E-15	1.631E-15	3.465E-16	4.144E-18	7.757E-25
U-234	ΣS(j):		2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
0U-234	U-234	3.800E-15	4.560E-17	4.460E-17	4.267E-17	3.655E-17	2.348E-17	4.987E-18	5.965E-20	1.117E-26
0U-235	U-235	9.835E-01	5.114E-04	5.002E-04	4.786E-04	4.099E-04	2.633E-04	5.595E-05	6.696E-07	1.256E-13
U-235	U-235	2.722E-03	1.415E-06	1.384E-06	1.324E-06	1.134E-06	7.288E-07	1.548E-07	1.853E-09	3.475E-16
U-235	ΣS(j):		5.128E-04	5.016E-04	4.799E-04	4.110E-04	2.640E-04	5.610E-05	6.714E-07	1.259E-13
0U-235	U-235	1.376E-02	7.156E-06	6.999E-06	6.696E-06	5.735E-06	3.684E-06	7.828E-07	9.369E-09	1.757E-15
U-235	U-235	3.809E-05	1.980E-08	1.937E-08	1.853E-08	1.587E-08	1.020E-08	2.167E-09	2.593E-11	4.863E-18
U-235	ΣS(j):		7.176E-06	7.019E-06	6.715E-06	5.751E-06	3.695E-06	7.850E-07	9.395E-09	1.762E-15
0U-235	U-235	8.257E-07	4.294E-10	4.200E-10	4.018E-10	3.441E-10	2.211E-10	4.697E-11	5.622E-13	1.054E-19
U-235	U-235	2.285E-09	1.188E-12	1.162E-12	1.112E-12	9.525E-13	6.119E-13	1.300E-13	1.556E-15	2.918E-22
U-235	ΣS(j):		4.306E-10	4.211E-10	4.029E-10	3.451E-10	2.217E-10	4.710E-11	5.637E-13	1.057E-19
0U-238	U-238	5.450E-07	6.540E-09	6.397E-09	6.120E-09	5.242E-09	3.367E-09	7.155E-10	8.563E-12	1.606E-18
U-238	U-238	1.599E-03	1.919E-05	1.877E-05	1.796E-05	1.538E-05	9.882E-06	2.100E-06	2.513E-08	4.713E-15
U-238	ΣS(j):		1.920E-05	1.878E-05	1.797E-05	1.539E-05	9.885E-06	2.100E-06	2.514E-08	4.714E-15

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	2.533E-11	2.478E-11	2.371E-11	2.030E-11	1.304E-11	2.771E-12	3.317E-14	6.221E-21
U-238	U-238	3.039E-11	3.647E-13	3.567E-13	3.412E-13	2.923E-13	1.878E-13	3.989E-14	4.774E-16	8.954E-23
U-238	ΣS(j):		2.570E-11	2.514E-11	2.405E-11	2.060E-11	1.323E-11	2.811E-12	3.365E-14	6.310E-21
0U-238	U-238	3.359E-07	4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
U-238	U-238	4.434E-13	5.321E-15	5.205E-15	4.979E-15	4.265E-15	2.740E-15	5.821E-16	6.967E-18	1.307E-24
U-238	ΣS(j):		4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
0U-238	U-238	6.383E-15	7.659E-17	7.492E-17	7.167E-17	6.139E-17	3.944E-17	8.379E-18	1.003E-19	1.881E-26
U-238	U-238	3.196E-07	3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
U-238	ΣS(j):		3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
0U-238	U-238	4.219E-13	5.063E-15	4.952E-15	4.738E-15	4.058E-15	2.607E-15	5.539E-16	6.629E-18	1.243E-24
U-238	U-238	6.073E-15	7.287E-17	7.128E-17	6.819E-17	5.841E-17	3.752E-17	7.972E-18	9.541E-20	1.789E-26
U-238	ΣS(j):		5.136E-15	5.023E-15	4.806E-15	4.116E-15	2.644E-15	5.618E-16	6.724E-18	1.261E-24
0U-238	U-238	6.713E-11	8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
U-238	U-238	8.862E-17	1.063E-18	1.040E-18	9.951E-19	8.523E-19	5.475E-19	1.163E-19	1.392E-21	2.611E-28
U-238	ΣS(j):		8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
0U-238	U-238	1.276E-18	1.531E-20	1.497E-20	1.432E-20	1.227E-20	7.881E-21	1.674E-21	2.004E-23	3.758E-30
U-238	U-238	3.200E-10	3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
U-238	ΣS(j):		3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
0U-238	U-238	4.224E-16	5.069E-18	4.958E-18	4.743E-18	4.063E-18	2.610E-18	5.545E-19	6.637E-21	1.245E-27
U-238	U-238	6.080E-18	7.296E-20	7.136E-20	6.827E-20	5.848E-20	3.757E-20	7.982E-21	9.553E-23	1.791E-29
U-238	ΣS(j):		5.142E-18	5.029E-18	4.812E-18	4.121E-18	2.647E-18	5.625E-19	6.732E-21	1.263E-27
0U-238	U-238	9.980E-01	1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
U-238	U-238	1.317E-06	1.581E-08	1.546E-08	1.479E-08	1.267E-08	8.139E-09	1.729E-09	2.070E-11	3.882E-18
U-238	ΣS(j):		1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
0U-238	U-238	1.896E-08	2.275E-10	2.226E-10	2.129E-10	1.824E-10	1.172E-10	2.489E-11	2.979E-13	5.587E-20
U-238	U-238	2.096E-04	2.515E-06	2.460E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.293E-09	6.177E-16
U-238	ΣS(j):		2.516E-06	2.461E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.294E-09	6.177E-16
0U-238	U-238	2.767E-10	3.320E-12	3.248E-12	3.107E-12	2.661E-12	1.710E-12	3.632E-13	4.347E-15	8.153E-22
U-238	U-238	3.983E-12	4.779E-14	4.675E-14	4.472E-14	3.831E-14	2.461E-14	5.229E-15	6.258E-17	1.174E-23
U-238	ΣS(j):		3.368E-12	3.294E-12	3.152E-12	2.700E-12	1.734E-12	3.685E-13	4.410E-15	8.270E-22
0U-238	U-238	1.994E-04	2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
U-238	U-238	2.633E-10	3.159E-12	3.090E-12	2.956E-12	2.532E-12	1.627E-12	3.456E-13	4.136E-15	7.757E-22
U-238	ΣS(j):		2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
0U-238	U-238	3.789E-12	4.547E-14	4.448E-14	4.255E-14	3.645E-14	2.341E-14	4.975E-15	5.954E-17	1.117E-23
U-238	U-238	4.189E-08	5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.499E-11	6.582E-13	1.234E-19
U-238	ΣS(j):		5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.500E-11	6.582E-13	1.234E-19
0U-238	U-238	5.530E-14	6.636E-16	6.490E-16	6.209E-16	5.318E-16	3.416E-16	7.259E-17	8.688E-19	1.629E-25

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	9.551E-18	9.342E-18	8.938E-18	7.655E-18	4.918E-18	1.045E-18	1.251E-20	2.345E-27
U-238	ΣS(j):		6.731E-16	6.584E-16	6.299E-16	5.395E-16	3.466E-16	7.364E-17	8.813E-19	1.653E-25
0U-238	U-238	1.997E-07	2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
U-238	U-238	2.636E-13	3.163E-15	3.094E-15	2.960E-15	2.535E-15	1.629E-15	3.460E-16	4.141E-18	7.766E-25
U-238	ΣS(j):		2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
0U-238	U-238	3.794E-15	4.553E-17	4.453E-17	4.260E-17	3.649E-17	2.344E-17	4.981E-18	5.961E-20	1.118E-26

THF(i) is the thread fraction of the parent nuclide.
0RESCALC.EXE execution time = 121.27 seconds

2001 HEAST – Risk

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   Part III: Intake Quantities and Health Risk Factors
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 Cancer Risk Slope Factors ..............................    2
 Risk Slope and ETFG for the Ground Pathway ..............    5
 Amount of Intake Quantities and Excess Cancer Risks
      Time= 0.000E+00 ...................................    6
      Time= 1.000E+00 ...................................   10
      Time= 3.000E+00 ...................................   14
      Time= 1.000E+01 ...................................   18
      Time= 3.000E+01 ...................................   22
      Time= 1.000E+02 ...................................   26
      Time= 3.000E+02 ...................................   30
      Time= 1.000E+03 ...................................   34
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Cancer Risk Slope Factors Summary Table
Risk Library: 2001 HEAST Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	3.48E-10	SLPF(1,1)
Sf-1	Ac-227+D1	1.49E-06	3.48E-10	SLPF(2,1)
Sf-1	Ac-227+D2	1.23E-06	3.48E-10	SLPF(3,1)
Sf-1	Ac-227+D3	1.25E-06	3.48E-10	SLPF(4,1)
Sf-1	Ac-227+D4	5.73E-07	3.48E-10	SLPF(5,1)
Sf-1	Ac-227+D5	5.94E-07	3.48E-10	SLPF(6,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(7,1)
Sf-1	Pb-210+D	4.21E-09	1.41E-09	SLPF(13,1)
Sf-1	Pb-210+D1	4.21E-09	1.41E-09	SLPF(14,1)
Sf-1	Pb-210+D2	1.02E-08	1.41E-09	SLPF(15,1)
Sf-1	Pb-210+D3	7.46E-09	1.41E-09	SLPF(16,1)
Sf-1	Ra-226+D	8.49E-06	2.29E-08	SLPF(17,1)
Sf-1	Ra-226+D1	8.49E-06	2.29E-08	SLPF(20,1)
Sf-1	Ra-226+D2	7.51E-06	2.29E-08	SLPF(23,1)
Sf-1	Ra-226+D3	7.51E-06	2.29E-08	SLPF(26,1)
Sf-1	Ra-226+D4	3.20E-08	2.29E-08	SLPF(29,1)
Sf-1	Ra-228+D	4.53E-06	0.00E+00	SLPF(32,1)
Sf-1	Th-228+D	7.77E-06	5.59E-09	SLPF(33,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(34,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(49,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(50,1)
Sf-1	U-235+D	5.43E-07	5.18E-07	SLPF(65,1)
Sf-1	U-238	4.99E-11	4.99E-11	SLPF(71,1)
Sf-1	U-238+D	8.80E-06	4.99E-11	SLPF(72,1)
Sf-1	U-238+D1	8.50E-08	4.99E-11	SLPF(87,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	1.49E-07	SLPF(1,2)
Sf-2	Ac-227+D1	2.09E-07	1.49E-07	SLPF(2,2)
Sf-2	Ac-227+D2	1.74E-07	1.49E-07	SLPF(3,2)
Sf-2	Ac-227+D3	1.74E-07	1.49E-07	SLPF(4,2)
Sf-2	Ac-227+D4	1.49E-07	1.49E-07	SLPF(5,2)
Sf-2	Ac-227+D5	1.49E-07	1.49E-07	SLPF(6,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(7,2)
Sf-2	Pb-210+D	1.39E-08	2.77E-09	SLPF(13,2)
Sf-2	Pb-210+D1	1.39E-08	2.77E-09	SLPF(14,2)
Sf-2	Pb-210+D2	3.09E-09	2.77E-09	SLPF(15,2)
Sf-2	Pb-210+D3	2.77E-09	2.77E-09	SLPF(16,2)
Sf-2	Ra-226+D	1.16E-08	1.15E-08	SLPF(17,2)
Sf-2	Ra-226+D1	1.16E-08	1.15E-08	SLPF(20,2)
Sf-2	Ra-226+D2	1.15E-08	1.15E-08	SLPF(23,2)
Sf-2	Ra-226+D3	1.15E-08	1.15E-08	SLPF(26,2)
Sf-2	Ra-226+D4	1.15E-08	1.15E-08	SLPF(29,2)
Sf-2	Ra-228+D	5.23E-09	5.18E-09	SLPF(32,2)
Sf-2	Th-228+D	1.43E-07	1.32E-07	SLPF(33,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(34,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(49,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(50,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(65,2)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: 2001 HEAST Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-2	U-238	9.32E-09	9.32E-09	SLPF(71,2)
Sf-2	U-238+D	9.35E-09	9.32E-09	SLPF(72,2)
Sf-2	U-238+D1	9.35E-09	9.32E-09	SLPF(87,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.54E-10	2.45E-10	SLPF(1,3)
Sf-3	Ac-227+D1	6.54E-10	2.45E-10	SLPF(2,3)
Sf-3	Ac-227+D2	5.95E-10	2.45E-10	SLPF(3,3)
Sf-3	Ac-227+D3	5.95E-10	2.45E-10	SLPF(4,3)
Sf-3	Ac-227+D4	2.56E-10	2.45E-10	SLPF(5,3)
Sf-3	Ac-227+D5	2.56E-10	2.45E-10	SLPF(6,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(7,3)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(13,3)
Sf-3	Pb-210+D1	3.44E-09	1.18E-09	SLPF(14,3)
Sf-3	Pb-210+D2	1.19E-09	1.18E-09	SLPF(15,3)
Sf-3	Pb-210+D3	1.18E-09	1.18E-09	SLPF(16,3)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(17,3)
Sf-3	Ra-226+D1	5.15E-10	5.14E-10	SLPF(20,3)
Sf-3	Ra-226+D2	5.14E-10	5.14E-10	SLPF(23,3)
Sf-3	Ra-226+D3	5.14E-10	5.14E-10	SLPF(26,3)
Sf-3	Ra-226+D4	5.14E-10	5.14E-10	SLPF(29,3)
Sf-3	Ra-228+D	1.43E-09	1.43E-09	SLPF(32,3)
Sf-3	Th-228+D	4.22E-10	1.48E-10	SLPF(33,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(34,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(49,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(50,3)
Sf-3	U-235+D	9.76E-11	9.44E-11	SLPF(65,3)
Sf-3	U-238	8.66E-11	8.66E-11	SLPF(71,3)
Sf-3	U-238+D	1.24E-10	8.66E-11	SLPF(72,3)
Sf-3	U-238+D1	1.21E-10	8.66E-11	SLPF(87,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.87E-10	2.01E-10	SLPF(1,4)
Sf-3	Ac-227+D1	4.87E-10	2.01E-10	SLPF(2,4)
Sf-3	Ac-227+D2	4.47E-10	2.01E-10	SLPF(3,4)
Sf-3	Ac-227+D3	4.47E-10	2.01E-10	SLPF(4,4)
Sf-3	Ac-227+D4	2.09E-10	2.01E-10	SLPF(5,4)
Sf-3	Ac-227+D5	2.09E-10	2.01E-10	SLPF(6,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(7,4)
Sf-3	Pb-210+D	1.27E-09	8.81E-10	SLPF(13,4)
Sf-3	Pb-210+D1	1.27E-09	8.81E-10	SLPF(14,4)
Sf-3	Pb-210+D2	8.90E-10	8.81E-10	SLPF(15,4)
Sf-3	Pb-210+D3	8.81E-10	8.81E-10	SLPF(16,4)
Sf-3	Ra-226+D	3.86E-10	3.85E-10	SLPF(17,4)
Sf-3	Ra-226+D1	3.86E-10	3.85E-10	SLPF(20,4)
Sf-3	Ra-226+D2	3.85E-10	3.85E-10	SLPF(23,4)
Sf-3	Ra-226+D3	3.85E-10	3.85E-10	SLPF(26,4)
Sf-3	Ra-226+D4	3.85E-10	3.85E-10	SLPF(29,4)
Sf-3	Ra-228+D	1.04E-09	1.04E-09	SLPF(32,4)
Sf-3	Th-228+D	3.00E-10	1.07E-10	SLPF(33,4)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: 2001 HEAST Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(34,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(49,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(50,4)
Sf-3	U-235+D	7.18E-11	6.96E-11	SLPF(65,4)
Sf-3	U-238	6.40E-11	6.40E-11	SLPF(71,4)
Sf-3	U-238+D	8.97E-11	6.40E-11	SLPF(72,4)
Sf-3	U-238+D1	8.71E-11	6.40E-11	SLPF(87,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	3.81E-10	SLPF(1,5)
Sf-3	Ac-227+D1	1.16E-09	3.81E-10	SLPF(2,5)
Sf-3	Ac-227+D2	1.04E-09	3.81E-10	SLPF(3,5)
Sf-3	Ac-227+D3	1.04E-09	3.81E-10	SLPF(4,5)
Sf-3	Ac-227+D4	4.00E-10	3.81E-10	SLPF(5,5)
Sf-3	Ac-227+D5	4.00E-10	3.81E-10	SLPF(6,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(7,5)
Sf-3	Pb-210+D	2.66E-09	1.84E-09	SLPF(13,5)
Sf-3	Pb-210+D1	2.66E-09	1.84E-09	SLPF(14,5)
Sf-3	Pb-210+D2	1.87E-09	1.84E-09	SLPF(15,5)
Sf-3	Pb-210+D3	1.84E-09	1.84E-09	SLPF(16,5)
Sf-3	Ra-226+D	7.30E-10	7.29E-10	SLPF(17,5)
Sf-3	Ra-226+D1	7.30E-10	7.29E-10	SLPF(20,5)
Sf-3	Ra-226+D2	7.29E-10	7.29E-10	SLPF(23,5)
Sf-3	Ra-226+D3	7.29E-10	7.29E-10	SLPF(26,5)
Sf-3	Ra-226+D4	7.29E-10	7.29E-10	SLPF(29,5)
Sf-3	Ra-228+D	2.29E-09	2.28E-09	SLPF(32,5)
Sf-3	Th-228+D	8.09E-10	2.89E-10	SLPF(33,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(34,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(49,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(50,5)
Sf-3	U-235+D	1.63E-10	1.57E-10	SLPF(65,5)
Sf-3	U-238	1.43E-10	1.43E-10	SLPF(71,5)
Sf-3	U-238+D	2.17E-10	1.43E-10	SLPF(72,5)
Sf-3	U-238+D1	2.10E-10	1.43E-10	SLPF(87,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Risk Slope and Environmental Transport Factors for the Ground Pathway

0Nuclide (i)	Slope(i)* t=	ETFG(i,t) At Time in Years (dimensionless) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	3.480E-10	3.303E-01	3.303E-01	3.303E-01	3.303E-01	3.303E-01	3.304E-01	3.305E-01	3.306E-01
Ac-228	4.530E-06	3.217E-01	3.217E-01	3.217E-01	3.217E-01	3.216E-01	3.214E-01	3.205E-01	3.157E-01
At-218	3.570E-09	3.317E-01	3.317E-01	3.317E-01	3.317E-01	3.317E-01	3.317E-01	3.317E-01	3.317E-01
At-219	-2.000E+00	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Bi-210	2.760E-09	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.287E-01	3.287E-01	3.289E-01	3.288E-01
Bi-211	1.880E-07	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.274E-01	3.273E-01	3.259E-01
Bi-212	8.870E-07	3.218E-01	3.218E-01	3.218E-01	3.217E-01	3.217E-01	3.215E-01	3.208E-01	3.165E-01
Bi-214	7.480E-06	3.183E-01	3.183E-01	3.183E-01	3.182E-01	3.181E-01	3.178E-01	3.166E-01	3.104E-01
Bi-215	-2.000E+00	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Fr-223	1.400E-07	3.287E-01	3.287E-01	3.287E-01	3.287E-01	3.287E-01	3.288E-01	3.288E-01	3.284E-01
Hg-206	-2.000E+00	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Pa-231	1.390E-07	3.278E-01	3.278E-01	3.278E-01	3.278E-01	3.278E-01	3.278E-01	3.277E-01	3.265E-01
Pa-234	8.710E-06	3.229E-01	3.229E-01	3.229E-01	3.228E-01	3.228E-01	3.226E-01	3.220E-01	3.180E-01
Pa-234m	6.870E-08	3.235E-01	3.235E-01	3.235E-01	3.235E-01	3.234E-01	3.233E-01	3.227E-01	3.193E-01
Pb-210	1.410E-09	3.355E-01	3.355E-01	3.355E-01	3.355E-01	3.355E-01	3.355E-01	3.355E-01	3.355E-01
Pb-211	2.290E-07	3.245E-01	3.245E-01	3.245E-01	3.245E-01	3.245E-01	3.244E-01	3.240E-01	3.211E-01
Pb-212	5.090E-07	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.285E-01
Pb-214	9.820E-07	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.273E-01	3.258E-01
Po-210	3.950E-11	3.232E-01	3.232E-01	3.232E-01	3.231E-01	3.231E-01	3.229E-01	3.224E-01	3.187E-01
Po-211	3.580E-08	3.226E-01	3.226E-01	3.226E-01	3.226E-01	3.225E-01	3.224E-01	3.218E-01	3.183E-01
Po-212	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-214	3.860E-10	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.220E-01	3.219E-01	3.213E-01	3.175E-01
Po-215	7.480E-10	3.254E-01	3.254E-01	3.254E-01	3.254E-01	3.254E-01	3.253E-01	3.250E-01	3.226E-01
Po-216	7.870E-11	3.227E-01	3.227E-01	3.227E-01	3.227E-01	3.227E-01	3.225E-01	3.218E-01	3.179E-01
Po-218	4.260E-11	3.227E-01	3.227E-01	3.227E-01	3.227E-01	3.226E-01	3.225E-01	3.218E-01	3.179E-01
Ra-223	4.340E-07	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.290E-01	3.285E-01
Ra-224	3.720E-08	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.282E-01
Ra-226	2.290E-08	3.293E-01	3.293E-01	3.293E-01	3.293E-01	3.293E-01	3.293E-01	3.294E-01	3.289E-01
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Rn-218	3.390E-09	3.238E-01	3.238E-01	3.238E-01	3.238E-01	3.238E-01	3.237E-01	3.233E-01	3.205E-01
Rn-219	2.250E-07	3.276E-01	3.276E-01	3.276E-01	3.276E-01	3.276E-01	3.276E-01	3.275E-01	3.259E-01
Rn-220	1.700E-09	3.243E-01	3.243E-01	3.243E-01	3.243E-01	3.243E-01	3.242E-01	3.238E-01	3.212E-01
Rn-222	1.740E-09	3.245E-01	3.245E-01	3.245E-01	3.245E-01	3.245E-01	3.244E-01	3.241E-01	3.216E-01
Th-227	3.780E-07	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.285E-01	3.274E-01
Th-228	5.590E-09	3.300E-01	3.300E-01	3.300E-01	3.300E-01	3.300E-01	3.301E-01	3.302E-01	3.303E-01
Th-230	8.190E-10	3.302E-01	3.302E-01	3.302E-01	3.302E-01	3.302E-01	3.302E-01	3.304E-01	3.306E-01
Th-231	2.450E-08	3.307E-01	3.307E-01	3.307E-01	3.307E-01	3.307E-01	3.307E-01	3.309E-01	3.312E-01
Th-232	3.420E-10	3.314E-01	3.314E-01	3.314E-01	3.314E-01	3.314E-01	3.314E-01	3.315E-01	3.318E-01
Th-234	1.630E-08	3.305E-01	3.305E-01	3.305E-01	3.305E-01	3.305E-01	3.305E-01	3.306E-01	3.309E-01
Tl-206	6.050E-09	3.274E-01	3.274E-01	3.274E-01	3.275E-01	3.275E-01	3.276E-01	3.278E-01	3.280E-01
Tl-207	1.520E-08	3.249E-01	3.249E-01	3.249E-01	3.248E-01	3.248E-01	3.247E-01	3.244E-01	3.217E-01
Tl-208	1.760E-05	3.117E-01	3.117E-01	3.116E-01	3.116E-01	3.114E-01	3.108E-01	3.090E-01	3.002E-01
Tl-210	0.000E+00	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
U-234	2.520E-10	3.319E-01	3.319E-01	3.319E-01	3.319E-01	3.319E-01	3.320E-01	3.321E-01	3.324E-01
U-235	5.180E-07	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.295E-01	3.292E-01
U-238	4.990E-11	3.389E-01	3.389E-01	3.389E-01	3.389E-01	3.389E-01	3.389E-01	3.389E-01	3.389E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.959E-04	0.000E+00	0.000E+00	0.000E+00	2.253E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-01
Pa-231	3.919E-04	0.000E+00	0.000E+00	0.000E+00	4.506E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.506E-01
Pb-210	2.239E-04	0.000E+00	0.000E+00	0.000E+00	2.575E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.575E-01
Ra-226	1.959E-04	0.000E+00	0.000E+00	0.000E+00	2.253E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-01
Ra-228	1.008E-05	0.000E+00	0.000E+00	0.000E+00	1.159E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.159E-02
Th-228	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.359E-04	0.000E+00	0.000E+00	0.000E+00	3.863E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.863E-01
U-235	1.456E-05	0.000E+00	0.000E+00	0.000E+00	1.674E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.674E-02
U-238	3.359E-04	0.000E+00	0.000E+00	0.000E+00	3.863E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.863E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.319E-08	0.0538	8.891E-10	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.691E-09	0.0042
Pa-231	1.398E-08	0.0103	3.908E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.694E-09	0.0027
Pb-210	1.349E-10	0.0001	9.050E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-08	0.0147
Ra-226	9.022E-07	0.6629	1.078E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.826E-09	0.0057
Ra-228	3.313E-08	0.0243	3.328E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.673E-09	0.0012
Th-228	5.631E-08	0.0414	9.222E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.012E-10	0.0004
Th-230	8.109E-09	0.0060	2.392E-08	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.950E-07	0.1433
Th-232	3.399E-12	0.0000	3.635E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0002
U-234	2.201E-11	0.0000	8.395E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.338E-09	0.0010
U-235	2.037E-09	0.0015	3.224E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.995E-11	0.0000
U-238	8.452E-09	0.0062	6.886E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.778E-09	0.0013
Total	1.098E-06	0.8064	2.569E-08	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1747

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.977E-08	0.0586
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.807E-08	0.0133
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.017E-08	0.0148
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.101E-07	0.6687
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.480E-08	0.0256
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.700E-08	0.0419
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-07	0.1668
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.628E-10	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-09	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-09	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-08	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.590E-08	0.0264	4.362E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.792E-09	0.0021
Pa-231	5.126E-08	0.0377	8.438E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.593E-09	0.0048
Pb-210	0.000E+00	0.0000	5.285E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-08	0.0086
Ra-226	4.505E-07	0.3310	7.581E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.757E-09	0.0064
Ra-228	1.005E-08	0.0074	1.064E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.578E-10	0.0002
Th-228	6.725E-09	0.0049	1.101E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.179E-11	0.0001
Th-230	4.600E-07	0.3379	2.399E-08	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E-07	0.1487
Th-232	7.267E-08	0.0534	1.102E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.167E-09	0.0016
U-234	2.246E-11	0.0000	8.398E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.338E-09	0.0010
U-235	2.038E-09	0.0015	3.232E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.001E-11	0.0000
U-238	8.452E-09	0.0062	6.887E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.779E-09	0.0013
Total	1.098E-06	0.8064	2.569E-08	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1747

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.913E-08	0.0288
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.870E-08	0.0431
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-08	0.0086
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.593E-07	0.3375
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.032E-08	0.0076
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.808E-09	0.0050
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.863E-07	0.5042
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.495E-08	0.0551
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.445E-09	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-09	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-08	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.915E-04	0.000E+00	0.000E+00	0.000E+00	2.202E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.202E-01
Pa-231	3.833E-04	0.000E+00	0.000E+00	0.000E+00	4.408E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.408E-01
Pb-210	2.208E-04	0.000E+00	0.000E+00	0.000E+00	2.539E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.539E-01
Ra-226	2.048E-04	0.000E+00	0.000E+00	0.000E+00	2.355E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.355E-01
Ra-228	1.195E-05	0.000E+00	0.000E+00	0.000E+00	1.374E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.374E-02
Th-228	2.285E-05	0.000E+00	0.000E+00	0.000E+00	2.628E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.628E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.286E-04	0.000E+00	0.000E+00	0.000E+00	3.778E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.778E-01
U-235	1.424E-05	0.000E+00	0.000E+00	0.000E+00	1.637E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.637E-02
U-238	3.286E-04	0.000E+00	0.000E+00	0.000E+00	3.778E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.778E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.155E-08	0.0519	8.692E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.564E-09	0.0040
Pa-231	1.367E-08	0.0099	3.823E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.613E-09	0.0026
Pb-210	1.437E-10	0.0001	9.075E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.000E-08	0.0145
Ra-226	9.225E-07	0.6686	1.102E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.002E-09	0.0058
Ra-228	3.383E-08	0.0245	3.399E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.708E-09	0.0012
Th-228	5.623E-08	0.0408	9.210E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.005E-10	0.0004
Th-230	8.109E-09	0.0059	2.392E-08	0.0173	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.950E-07	0.1413
Th-232	3.399E-12	0.0000	3.635E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0002
U-234	2.152E-11	0.0000	8.212E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-09	0.0009
U-235	1.993E-09	0.0014	3.153E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.864E-11	0.0000
U-238	8.267E-09	0.0060	6.736E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-09	0.0013
Total	1.116E-06	0.8091	2.566E-08	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1723

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.798E-08	0.0565
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.767E-08	0.0128
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E-08	0.0147
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.306E-07	0.6745
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.554E-08	0.0258
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.693E-08	0.0413
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-07	0.1645
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.628E-10	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.412E-09	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-09	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-08	0.0073
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.380E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.292E-08	0.0239	3.999E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.560E-09	0.0019
Pa-231	5.231E-08	0.0379	8.516E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.617E-09	0.0048
Pb-210	0.000E+00	0.0000	5.066E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-08	0.0081
Ra-226	4.432E-07	0.3212	7.599E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.925E-09	0.0065
Ra-228	9.451E-09	0.0068	1.040E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-10	0.0002
Th-228	4.680E-09	0.0034	7.662E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.996E-11	0.0000
Th-230	4.876E-07	0.3534	2.400E-08	0.0174	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-07	0.1470
Th-232	7.593E-08	0.0550	1.138E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-09	0.0016
U-234	2.202E-11	0.0000	8.215E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-09	0.0009
U-235	1.993E-09	0.0014	3.161E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.870E-11	0.0000
U-238	8.267E-09	0.0060	6.736E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-09	0.0013
Total	1.116E-06	0.8091	2.566E-08	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1723

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.588E-08	0.0260
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.978E-08	0.0433
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.121E-08	0.0081
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.522E-07	0.3277
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.694E-09	0.0070
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.737E-09	0.0034
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.145E-07	0.5178
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.830E-08	0.0567
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E-09	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-09	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-08	0.0073
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.380E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.829E-04	0.000E+00	0.000E+00	0.000E+00	2.103E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.103E-01
Pa-231	3.667E-04	0.000E+00	0.000E+00	0.000E+00	4.217E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.217E-01
Pb-210	2.157E-04	0.000E+00	0.000E+00	0.000E+00	2.480E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.480E-01
Ra-226	2.221E-04	0.000E+00	0.000E+00	0.000E+00	2.554E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.554E-01
Ra-228	1.500E-05	0.000E+00	0.000E+00	0.000E+00	1.725E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.725E-02
Th-228	1.814E-05	0.000E+00	0.000E+00	0.000E+00	2.086E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.086E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.143E-04	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01
U-235	1.362E-05	0.000E+00	0.000E+00	0.000E+00	1.566E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.566E-02
U-238	3.143E-04	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.839E-08	0.0483	8.309E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.318E-09	0.0038
Pa-231	1.308E-08	0.0092	3.657E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.457E-09	0.0024
Pb-210	1.610E-10	0.0001	9.149E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.016E-08	0.0142
Ra-226	9.623E-07	0.6790	1.150E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.347E-09	0.0059
Ra-228	3.497E-08	0.0247	3.514E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.766E-09	0.0012
Th-228	5.700E-08	0.0402	9.335E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.086E-10	0.0004
Th-230	8.109E-09	0.0057	2.392E-08	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.950E-07	0.1376
Th-232	3.399E-12	0.0000	3.635E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0002
U-234	2.059E-11	0.0000	7.856E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.252E-09	0.0009
U-235	1.907E-09	0.0013	3.017E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.610E-11	0.0000
U-238	7.909E-09	0.0056	6.444E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-09	0.0012
Total	1.154E-06	0.8141	2.560E-08	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1678

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.454E-08	0.0526
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.690E-08	0.0119
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-08	0.0144
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.707E-07	0.6849
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.674E-08	0.0259
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.770E-08	0.0407
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-07	0.1602
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-10	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-09	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.966E-09	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.637E-09	0.0068
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.417E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.767E-08	0.0195	3.362E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.152E-09	0.0015
Pa-231	5.380E-08	0.0380	8.604E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.623E-09	0.0047
Pb-210	0.000E+00	0.0000	4.655E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-08	0.0072
Ra-226	4.290E-07	0.3027	7.617E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.214E-09	0.0065
Ra-228	7.943E-09	0.0056	9.145E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.848E-10	0.0001
Th-228	2.266E-09	0.0016	3.710E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-11	0.0000
Th-230	5.415E-07	0.3821	2.401E-08	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.040E-07	0.1439
Th-232	8.177E-08	0.0577	1.204E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.389E-09	0.0017
U-234	2.118E-11	0.0000	7.860E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.252E-09	0.0009
U-235	1.907E-09	0.0013	3.026E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.617E-11	0.0000
U-238	7.909E-09	0.0056	6.444E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-09	0.0012
Total	1.154E-06	0.8141	2.560E-08	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.378E-07	0.1678

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.016E-08	0.0213
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.129E-08	0.0432
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-08	0.0073
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.383E-07	0.3093
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.137E-09	0.0057
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.294E-09	0.0016
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.695E-07	0.5430
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.427E-08	0.0595
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.352E-09	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.966E-09	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.637E-09	0.0068
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.417E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.559E-04	0.000E+00	0.000E+00	0.000E+00	1.792E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.792E-01
Pa-231	3.140E-04	0.000E+00	0.000E+00	0.000E+00	3.611E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.611E-01
Pb-210	2.081E-04	0.000E+00	0.000E+00	0.000E+00	2.393E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.393E-01
Ra-226	2.785E-04	0.000E+00	0.000E+00	0.000E+00	3.202E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.202E-01
Ra-228	2.099E-05	0.000E+00	0.000E+00	0.000E+00	2.414E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.414E-02
Th-228	1.944E-05	0.000E+00	0.000E+00	0.000E+00	2.236E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.236E-02
Th-230	2.798E-02	0.000E+00	0.000E+00	0.000E+00	3.218E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.218E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.218E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.218E-02
U-234	2.692E-04	0.000E+00	0.000E+00	0.000E+00	3.096E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.096E-01
U-235	1.167E-05	0.000E+00	0.000E+00	0.000E+00	1.342E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E-02
U-238	2.692E-04	0.000E+00	0.000E+00	0.000E+00	3.096E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.096E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.844E-08	0.0379	7.099E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.544E-09	0.0030
Pa-231	1.120E-08	0.0073	3.132E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.960E-09	0.0019
Pb-210	2.200E-10	0.0001	9.602E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.116E-08	0.0137
Ra-226	1.092E-06	0.7088	1.304E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.470E-09	0.0061
Ra-228	3.722E-08	0.0242	3.739E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.879E-09	0.0012
Th-228	6.102E-08	0.0396	9.995E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.517E-10	0.0004
Th-230	8.107E-09	0.0053	2.392E-08	0.0155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.949E-07	0.1266
Th-232	3.399E-12	0.0000	3.635E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0001
U-234	1.764E-11	0.0000	6.729E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.072E-09	0.0007
U-235	1.633E-09	0.0011	2.584E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.805E-11	0.0000
U-238	6.774E-09	0.0044	5.519E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.425E-09	0.0009
Total	1.276E-06	0.8287	2.543E-08	0.0165	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.384E-07	0.1548

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.369E-08	0.0414
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.448E-08	0.0094
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.148E-08	0.0139
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.101E-06	0.7150
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.910E-08	0.0254
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.177E-08	0.0401
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.270E-07	0.1474
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-10	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.157E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.684E-09	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.254E-09	0.0054
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.540E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.507E-08	0.0098	1.831E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.172E-09	0.0008
Pa-231	5.457E-08	0.0354	8.400E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.332E-09	0.0041
Pb-210	0.000E+00	0.0000	3.461E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.628E-09	0.0050
Ra-226	3.829E-07	0.2486	7.524E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.824E-09	0.0064
Ra-228	3.457E-09	0.0022	4.176E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.542E-11	0.0000
Th-228	1.790E-10	0.0001	2.931E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-12	0.0000
Th-230	7.170E-07	0.4656	2.403E-08	0.0156	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.081E-07	0.1351
Th-232	9.460E-08	0.0614	1.356E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.677E-09	0.0017
U-234	1.859E-11	0.0000	6.733E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.073E-09	0.0007
U-235	1.634E-09	0.0011	2.596E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.814E-11	0.0000
U-238	6.774E-09	0.0044	5.520E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.426E-09	0.0009
Total	1.276E-06	0.8287	2.543E-08	0.0165	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.384E-07	0.1548

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.643E-08	0.0107
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.174E-08	0.0401
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.663E-09	0.0050
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.928E-07	0.2550
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.537E-09	0.0023
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.812E-10	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.491E-07	0.6163
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.741E-08	0.0633
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.159E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E-09	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.254E-09	0.0054
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.540E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	9.951E-05	0.000E+00	0.000E+00	0.000E+00	1.144E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.144E-01
Pa-231	2.017E-04	0.000E+00	0.000E+00	0.000E+00	2.319E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.319E-01
Pb-210	2.392E-04	0.000E+00	0.000E+00	0.000E+00	2.750E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.750E-01
Ra-226	4.081E-04	0.000E+00	0.000E+00	0.000E+00	4.693E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.693E-01
Ra-228	2.449E-05	0.000E+00	0.000E+00	0.000E+00	2.816E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.816E-02
Th-228	2.434E-05	0.000E+00	0.000E+00	0.000E+00	2.799E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.799E-02
Th-230	2.797E-02	0.000E+00	0.000E+00	0.000E+00	3.216E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.216E+01
Th-232	2.798E-05	0.000E+00	0.000E+00	0.000E+00	3.217E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.217E-02
U-234	1.730E-04	0.000E+00	0.000E+00	0.000E+00	1.989E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.989E-01
U-235	7.495E-06	0.000E+00	0.000E+00	0.000E+00	8.618E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.618E-03
U-238	1.730E-04	0.000E+00	0.000E+00	0.000E+00	1.989E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.989E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.742E-08	0.0206	4.546E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.910E-09	0.0016
Pa-231	7.194E-09	0.0040	2.011E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.901E-09	0.0010
Pb-210	3.693E-10	0.0002	1.179E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.599E-08	0.0143
Ra-226	1.389E-06	0.7642	1.660E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E-08	0.0066
Ra-228	3.851E-08	0.0212	3.870E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.945E-09	0.0011
Th-228	6.432E-08	0.0354	1.054E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.873E-10	0.0004
Th-230	8.103E-09	0.0045	2.390E-08	0.0132	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.948E-07	0.1072
Th-232	3.397E-12	0.0000	3.633E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.229E-10	0.0001
U-234	1.133E-11	0.0000	4.323E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.889E-10	0.0004
U-235	1.049E-09	0.0006	1.660E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.087E-11	0.0000
U-238	4.351E-09	0.0024	3.546E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.157E-10	0.0005
Total	1.550E-06	0.8530	2.507E-08	0.0138	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.422E-07	0.1332

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.078E-08	0.0224
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.296E-09	0.0051
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-08	0.0146
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.401E-06	0.7709
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.046E-08	0.0223
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.512E-08	0.0358
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.268E-07	0.1248
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.626E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.435E-10	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.082E-09	0.0006
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.302E-09	0.0029
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.817E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.656E-09	0.0015	3.226E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.065E-10	0.0001
Pa-231	4.196E-08	0.0231	6.234E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.604E-09	0.0025
Pb-210	0.000E+00	0.0000	1.485E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.273E-09	0.0018
Ra-226	2.765E-07	0.1522	6.500E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.444E-09	0.0052
Ra-228	2.327E-10	0.0001	2.840E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.003E-12	0.0000
Th-228	1.267E-13	0.0000	2.077E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-15	0.0000
Th-230	1.121E-06	0.6167	2.411E-08	0.0133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.201E-07	0.1211
Th-232	1.026E-07	0.0565	1.453E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.850E-09	0.0016
U-234	1.363E-11	0.0000	4.330E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.895E-10	0.0004
U-235	1.050E-09	0.0006	1.677E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.100E-11	0.0000
U-238	4.351E-09	0.0024	3.546E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.158E-10	0.0005
Total	1.550E-06	0.8530	2.507E-08	0.0138	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.422E-07	0.1332

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.894E-09	0.0016
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.718E-08	0.0260
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.288E-09	0.0018
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.860E-07	0.1574
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.379E-10	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-13	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E-06	0.7511
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-07	0.0581
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.464E-10	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.083E-09	0.0006
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.302E-09	0.0029
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.817E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.107E-05	0.000E+00	0.000E+00	0.000E+00	2.423E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.423E-02
Pa-231	4.279E-05	0.000E+00	0.000E+00	0.000E+00	4.920E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.920E-02
Pb-210	4.251E-04	0.000E+00	0.000E+00	0.000E+00	4.888E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.888E-01
Ra-226	6.367E-04	0.000E+00	0.000E+00	0.000E+00	7.321E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.321E-01
Ra-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	2.840E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.840E-02
Th-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	2.840E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.840E-02
Th-230	2.792E-02	0.000E+00	0.000E+00	0.000E+00	3.210E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.210E+01
Th-232	2.794E-05	0.000E+00	0.000E+00	0.000E+00	3.213E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.213E-02
U-234	3.675E-05	0.000E+00	0.000E+00	0.000E+00	4.226E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.226E-02
U-235	1.592E-06	0.000E+00	0.000E+00	0.000E+00	1.831E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.831E-03
U-238	3.675E-05	0.000E+00	0.000E+00	0.000E+00	4.226E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.226E-02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.930E-09	0.0034	9.635E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.167E-10	0.0003
Pa-231	1.526E-09	0.0007	4.267E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.033E-10	0.0002
Pb-210	6.689E-10	0.0003	1.874E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.130E-08	0.0178
Ra-226	1.911E-06	0.8257	2.286E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.660E-08	0.0072
Ra-228	3.852E-08	0.0166	3.874E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.947E-09	0.0008
Th-228	6.438E-08	0.0278	1.057E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.890E-10	0.0003
Th-230	8.089E-09	0.0035	2.386E-08	0.0103	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.944E-07	0.0840
Th-232	3.393E-12	0.0000	3.628E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.226E-10	0.0001
U-234	2.408E-12	0.0000	9.185E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.464E-10	0.0001
U-235	2.229E-10	0.0001	3.527E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.558E-12	0.0000
U-238	9.241E-10	0.0004	7.534E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.946E-10	0.0001
Total	2.033E-06	0.8785	2.458E-08	0.0106	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.566E-07	0.1109

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.643E-09	0.0037
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.972E-09	0.0009
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.216E-08	0.0182
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-06	0.8330
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.047E-08	0.0175
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.518E-08	0.0282
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.264E-07	0.0978
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.623E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E-10	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.298E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-09	0.0005
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.315E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.099E-12	0.0000	7.410E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.743E-13	0.0000
Pa-231	9.450E-09	0.0041	1.389E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-09	0.0004
Pb-210	0.000E+00	0.0000	7.682E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.693E-10	0.0001
Ra-226	8.854E-08	0.0383	2.501E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.948E-09	0.0017
Ra-228	1.661E-14	0.0000	2.031E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.577E-16	0.0000
Th-228	1.198E-24	0.0000	1.963E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-26	0.0000
Th-230	1.831E-06	0.7912	2.425E-08	0.0105	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.482E-07	0.1072
Th-232	1.029E-07	0.0445	1.458E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.859E-09	0.0012
U-234	9.280E-12	0.0000	9.293E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.474E-10	0.0001
U-235	2.237E-10	0.0001	3.639E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.642E-12	0.0000
U-238	9.241E-10	0.0004	7.536E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.946E-10	0.0001
Total	2.033E-06	0.8785	2.458E-08	0.0106	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.566E-07	0.1109

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.647E-12	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E-08	0.0046
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-10	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.251E-08	0.0400
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-14	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.213E-24	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-06	0.9090
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-07	0.0458
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.660E-10	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.307E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-09	0.0005
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.315E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.511E-07	0.000E+00	0.000E+00	0.000E+00	2.888E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.888E-04
Pa-231	5.100E-07	0.000E+00	0.000E+00	0.000E+00	5.864E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.864E-04
Pb-210	5.421E-04	0.000E+00	0.000E+00	0.000E+00	6.234E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.234E-01
Ra-226	7.368E-04	0.000E+00	0.000E+00	0.000E+00	8.472E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.472E-01
Ra-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	2.830E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.830E-02
Th-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	2.830E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.830E-02
Th-230	2.776E-02	0.000E+00	0.000E+00	0.000E+00	3.192E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.192E+01
Th-232	2.784E-05	0.000E+00	0.000E+00	0.000E+00	3.201E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.201E-02
U-234	4.398E-07	0.000E+00	0.000E+00	0.000E+00	5.057E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.057E-04
U-235	1.906E-08	0.000E+00	0.000E+00	0.000E+00	2.192E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.192E-05
U-238	4.398E-07	0.000E+00	0.000E+00	0.000E+00	5.057E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.057E-04

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.449E-11	0.0000	1.148E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.350E-12	0.0000
Pa-231	1.819E-11	0.0000	5.086E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.807E-12	0.0000
Pb-210	8.109E-10	0.0003	2.262E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.985E-08	0.0197
Ra-226	2.131E-06	0.8419	2.558E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.858E-08	0.0073
Ra-228	3.828E-08	0.0151	3.860E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.940E-09	0.0008
Th-228	6.382E-08	0.0252	1.053E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.865E-10	0.0003
Th-230	8.047E-09	0.0032	2.373E-08	0.0094	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.934E-07	0.0764
Th-232	3.382E-12	0.0000	3.615E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.218E-10	0.0001
U-234	2.883E-14	0.0000	1.099E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.752E-12	0.0000
U-235	2.669E-12	0.0000	4.221E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.849E-14	0.0000
U-238	1.104E-11	0.0000	9.016E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.329E-12	0.0000
Total	2.242E-06	0.8858	2.435E-08	0.0096	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-07	0.1046

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.350E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.089E-08	0.0201
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.150E-06	0.8494
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.022E-08	0.0159
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.461E-08	0.0255
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.251E-07	0.0889
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.613E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.891E-12	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.346E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.531E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.759E-19	0.0000	2.138E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.369E-20	0.0000
Pa-231	1.127E-10	0.0000	1.657E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-11	0.0000
Pb-210	0.000E+00	0.0000	1.624E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.578E-14	0.0000
Ra-226	3.416E-09	0.0013	9.994E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-10	0.0001
Ra-228	2.363E-26	0.0000	2.151E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.050E-28	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.137E-06	0.8441	2.421E-08	0.0096	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.616E-07	0.1034
Th-232	1.021E-07	0.0403	1.453E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.848E-09	0.0011
U-234	1.054E-11	0.0000	2.305E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.049E-12	0.0000
U-235	2.695E-12	0.0000	4.616E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.140E-14	0.0000
U-238	1.105E-11	0.0000	9.027E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.330E-12	0.0000
Total	2.242E-06	0.8858	2.435E-08	0.0096	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-07	0.1046

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.918E-19	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.577E-09	0.0014
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.415E-26	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.423E-06	0.9570
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E-07	0.0415
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.382E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.781E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.531E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	4.643E-14	0.000E+00	0.000E+00	0.000E+00	5.339E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.339E-11
Pa-231	9.429E-14	0.000E+00	0.000E+00	0.000E+00	1.084E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.084E-10
Pb-210	5.367E-04	0.000E+00	0.000E+00	0.000E+00	6.171E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.171E-01
Ra-226	7.268E-04	0.000E+00	0.000E+00	0.000E+00	8.357E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.357E-01
Ra-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	2.794E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.794E-02
Th-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	2.794E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.794E-02
Th-230	2.723E-02	0.000E+00	0.000E+00	0.000E+00	3.131E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.131E+01
Th-232	2.748E-05	0.000E+00	0.000E+00	0.000E+00	3.160E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.160E-02
U-234	8.248E-14	0.000E+00	0.000E+00	0.000E+00	9.485E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.485E-11
U-235	3.574E-15	0.000E+00	0.000E+00	0.000E+00	4.110E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.110E-12
U-238	8.248E-14	0.000E+00	0.000E+00	0.000E+00	9.485E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.485E-11

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.740E-17	0.0000	2.123E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-18	0.0000
Pa-231	3.350E-18	0.0000	9.403E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.888E-19	0.0000
Pb-210	8.010E-10	0.0003	2.235E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.925E-08	0.0201
Ra-226	2.062E-06	0.8405	2.520E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-08	0.0075
Ra-228	3.721E-08	0.0152	3.810E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-09	0.0008
Th-228	6.142E-08	0.0250	1.039E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.776E-10	0.0003
Th-230	7.899E-09	0.0032	2.327E-08	0.0095	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.897E-07	0.0773
Th-232	3.341E-12	0.0000	3.569E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.189E-10	0.0001
U-234	5.412E-21	0.0000	2.061E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.285E-19	0.0000
U-235	5.000E-19	0.0000	7.916E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.472E-20	0.0000
U-238	2.052E-18	0.0000	1.691E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.367E-19	0.0000
Total	2.169E-06	0.8843	2.389E-08	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-07	0.1060

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.897E-17	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.333E-18	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.028E-08	0.0205
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.081E-06	0.8481
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.913E-08	0.0160
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.221E-08	0.0254
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.208E-07	0.0900
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.579E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.546E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.155E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.506E-18	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.453E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.073E-17	0.0000	3.061E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.246E-18	0.0000
Pb-210	0.000E+00	0.0000	7.318E-30	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.910E-27	0.0000
Ra-226	3.830E-14	0.0000	1.141E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E-15	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.071E-06	0.8441	2.375E-08	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.572E-07	0.1048
Th-232	9.864E-08	0.0402	1.434E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.811E-09	0.0011
U-234	1.034E-11	0.0000	1.185E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-12	0.0000
U-235	5.165E-19	0.0000	1.035E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.651E-20	0.0000
U-238	1.323E-15	0.0000	1.516E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.645E-16	0.0000
Total	2.169E-06	0.8843	2.389E-08	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-07	0.1060

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-17	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.917E-27	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.014E-14	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E-06	0.9586
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.016E-07	0.0414
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.174E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.340E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-15	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.453E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

DCFPAK 3.02 (Adult) – Dose

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Part I: Mixture Sums and Single Radionuclide Guidelines

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: DCFPAK3.02)	2.615E-04	2.615E-04	DCF1(1)
A-1	Ac-228 (Source: DCFPAK3.02)	5.044E+00	5.044E+00	DCF1(2)
A-1	At-218 (Source: DCFPAK3.02)	5.567E-05	5.567E-05	DCF1(3)
A-1	At-219 (Source: DCFPAK3.02)	0.000E+00	0.000E+00	DCF1(4)
A-1	Bi-210 (Source: DCFPAK3.02)	5.473E-03	5.474E-03	DCF1(5)
A-1	Bi-211 (Source: DCFPAK3.02)	2.410E-01	2.410E-01	DCF1(6)
A-1	Bi-212 (Source: DCFPAK3.02)	6.258E-01	6.259E-01	DCF1(7)
A-1	Bi-214 (Source: DCFPAK3.02)	9.135E+00	9.136E+00	DCF1(8)
A-1	Bi-215 (Source: DCFPAK3.02)	1.369E+00	1.369E+00	DCF1(9)
A-1	Fr-223 (Source: DCFPAK3.02)	1.758E-01	1.758E-01	DCF1(10)
A-1	Hg-206 (Source: DCFPAK3.02)	6.127E-01	6.128E-01	DCF1(11)
A-1	Pa-231 (Source: DCFPAK3.02)	1.608E-01	1.609E-01	DCF1(12)
A-1	Pa-234 (Source: DCFPAK3.02)	8.275E+00	8.276E+00	DCF1(13)
A-1	Pa-234m (Source: DCFPAK3.02)	1.257E-01	1.257E-01	DCF1(14)
A-1	Pb-210 (Source: DCFPAK3.02)	2.092E-03	2.092E-03	DCF1(15)
A-1	Pb-211 (Source: DCFPAK3.02)	3.680E-01	3.680E-01	DCF1(16)
A-1	Pb-212 (Source: DCFPAK3.02)	6.314E-01	6.315E-01	DCF1(17)
A-1	Pb-214 (Source: DCFPAK3.02)	1.257E+00	1.257E+00	DCF1(18)
A-1	Po-210 (Source: DCFPAK3.02)	5.641E-05	5.642E-05	DCF1(19)
A-1	Po-211 (Source: DCFPAK3.02)	4.707E-02	4.708E-02	DCF1(20)
A-1	Po-212 (Source: DCFPAK3.02)	0.000E+00	0.000E+00	DCF1(21)
A-1	Po-214 (Source: DCFPAK3.02)	4.801E-04	4.801E-04	DCF1(22)
A-1	Po-215 (Source: DCFPAK3.02)	9.452E-04	9.453E-04	DCF1(23)
A-1	Po-216 (Source: DCFPAK3.02)	8.873E-05	8.874E-05	DCF1(24)
A-1	Po-218 (Source: DCFPAK3.02)	9.228E-09	9.229E-09	DCF1(25)
A-1	Ra-223 (Source: DCFPAK3.02)	5.791E-01	5.791E-01	DCF1(26)
A-1	Ra-224 (Source: DCFPAK3.02)	4.950E-02	4.951E-02	DCF1(27)
A-1	Ra-226 (Source: DCFPAK3.02)	3.176E-02	3.176E-02	DCF1(28)
A-1	Ra-228 (Source: DCFPAK3.02)	6.575E-05	6.576E-05	DCF1(29)
A-1	Rn-218 (Source: DCFPAK3.02)	4.259E-03	4.260E-03	DCF1(30)
A-1	Rn-219 (Source: DCFPAK3.02)	2.970E-01	2.970E-01	DCF1(31)
A-1	Rn-220 (Source: DCFPAK3.02)	3.474E-03	3.475E-03	DCF1(32)
A-1	Rn-222 (Source: DCFPAK3.02)	2.130E-03	2.130E-03	DCF1(33)
A-1	Th-227 (Source: DCFPAK3.02)	5.641E-01	5.642E-01	DCF1(34)
A-1	Th-228 (Source: DCFPAK3.02)	7.248E-03	7.249E-03	DCF1(35)
A-1	Th-230 (Source: DCFPAK3.02)	1.106E-03	1.106E-03	DCF1(36)
A-1	Th-231 (Source: DCFPAK3.02)	3.250E-02	3.251E-02	DCF1(37)
A-1	Th-232 (Source: DCFPAK3.02)	4.782E-04	4.783E-04	DCF1(38)
A-1	Th-234 (Source: DCFPAK3.02)	2.316E-02	2.317E-02	DCF1(39)
A-1	Tl-206 (Source: DCFPAK3.02)	1.278E-02	1.278E-02	DCF1(40)
A-1	Tl-207 (Source: DCFPAK3.02)	2.391E-02	2.391E-02	DCF1(41)
A-1	Tl-208 (Source: DCFPAK3.02)	2.167E+01	2.167E+01	DCF1(42)
A-1	Tl-210 (Source: DCFPAK3.02)	1.677E+01	1.678E+01	DCF1(43)
A-1	U-234 (Source: DCFPAK3.02)	3.456E-04	3.456E-04	DCF1(44)
A-1	U-235 (Source: DCFPAK3.02)	7.005E-01	7.006E-01	DCF1(45)
A-1	U-238 (Source: DCFPAK3.02)	1.713E-04	1.713E-04	DCF1(46)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.464E-01	5.760E-01	DCF2(1)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Ac-227+D1	6.464E-01	5.760E-01	DCF2(2)
B-1	Ac-227+D2	6.081E-01	5.760E-01	DCF2(3)
B-1	Ac-227+D3	6.081E-01	5.760E-01	DCF2(4)
B-1	Ac-227+D4	5.761E-01	5.760E-01	DCF2(5)
B-1	Ac-227+D5	5.761E-01	5.760E-01	DCF2(6)
B-1	Pa-231	8.505E-01	8.505E-01	DCF2(7)
B-1	Pb-210+D	3.708E-02	2.077E-02	DCF2(13)
B-1	Pb-210+D1	3.708E-02	2.077E-02	DCF2(14)
B-1	Pb-210+D2	2.126E-02	2.077E-02	DCF2(15)
B-1	Pb-210+D3	2.077E-02	2.077E-02	DCF2(16)
B-1	Ra-226+D	3.528E-02	3.517E-02	DCF2(17)
B-1	Ra-226+D1	3.528E-02	3.517E-02	DCF2(20)
B-1	Ra-226+D2	3.523E-02	3.517E-02	DCF2(23)
B-1	Ra-226+D3	3.523E-02	3.517E-02	DCF2(26)
B-1	Ra-226+D4	3.517E-02	3.517E-02	DCF2(29)
B-1	Ra-228+D	5.943E-02	5.938E-02	DCF2(32)
B-1	Th-228+D	1.600E-01	1.468E-01	DCF2(33)
B-1	Th-230	3.759E-01	3.759E-01	DCF2(34)
B-1	Th-232	4.070E-01	4.070E-01	DCF2(49)
B-1	U-234	3.479E-02	3.479E-02	DCF2(50)
B-1	U-235+D	3.132E-02	3.132E-02	DCF2(65)
B-1	U-238	2.973E-02	2.973E-02	DCF2(71)
B-1	U-238+D	2.976E-02	2.973E-02	DCF2(72)
B-1	U-238+D1	2.976E-02	2.973E-02	DCF2(87)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.607E-03	1.191E-03	DCF3(1)
D-1	Ac-227+D1	1.607E-03	1.191E-03	DCF3(2)
D-1	Ac-227+D2	1.582E-03	1.191E-03	DCF3(3)
D-1	Ac-227+D3	1.582E-03	1.191E-03	DCF3(4)
D-1	Ac-227+D4	1.201E-03	1.191E-03	DCF3(5)
D-1	Ac-227+D5	1.201E-03	1.191E-03	DCF3(6)
D-1	Pa-231	1.772E-03	1.772E-03	DCF3(7)
D-1	Pb-210+D	7.057E-03	2.575E-03	DCF3(13)
D-1	Pb-210+D1	7.057E-03	2.575E-03	DCF3(14)
D-1	Pb-210+D2	2.580E-03	2.575E-03	DCF3(15)
D-1	Pb-210+D3	2.575E-03	2.575E-03	DCF3(16)
D-1	Ra-226+D	1.037E-03	1.036E-03	DCF3(17)
D-1	Ra-226+D1	1.037E-03	1.036E-03	DCF3(20)
D-1	Ra-226+D2	1.036E-03	1.036E-03	DCF3(23)
D-1	Ra-226+D3	1.036E-03	1.036E-03	DCF3(26)
D-1	Ra-226+D4	1.036E-03	1.036E-03	DCF3(29)
D-1	Ra-228+D	2.577E-03	2.575E-03	DCF3(32)
D-1	Th-228+D	5.286E-04	2.664E-04	DCF3(33)
D-1	Th-230	7.918E-04	7.918E-04	DCF3(34)
D-1	Th-232	8.547E-04	8.547E-04	DCF3(49)
D-1	U-234	1.831E-04	1.831E-04	DCF3(50)
D-1	U-235+D	1.740E-04	1.728E-04	DCF3(65)
D-1	U-238	1.650E-04	1.650E-04	DCF3(71)
D-1	U-238+D	1.791E-04	1.650E-04	DCF3(72)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-238+D1	1.776E-04	1.650E-04	DCF3(87)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Ac-227+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(2,1)
D-34	Ac-227+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,2)
D-34	Ac-227+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,3)
D-34				
D-34	Ac-227+D2 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(3,1)
D-34	Ac-227+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,2)
D-34	Ac-227+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,3)
D-34				
D-34	Ac-227+D3 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Ac-227+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,2)
D-34	Ac-227+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-34				
D-34	Ac-227+D4 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Ac-227+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,2)
D-34	Ac-227+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)
D-34				
D-34	Ac-227+D5 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	Ac-227+D5 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,2)
D-34	Ac-227+D5 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(13,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(13,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(13,3)
D-34				
D-34	Pb-210+D1 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(14,1)
D-34	Pb-210+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(14,2)
D-34	Pb-210+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(14,3)
D-34				
D-34	Pb-210+D2 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(15,1)
D-34	Pb-210+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(15,2)
D-34	Pb-210+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(15,3)
D-34				
D-34	Pb-210+D3 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(16,1)
D-34	Pb-210+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(16,2)
D-34	Pb-210+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(16,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(17,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Ra-226+D1 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(20,1)
D-34	Ra-226+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,2)
D-34	Ra-226+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,3)
D-34				
D-34	Ra-226+D2 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(23,1)
D-34	Ra-226+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,2)
D-34	Ra-226+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,3)
D-34				
D-34	Ra-226+D3 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(26,1)
D-34	Ra-226+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,2)
D-34	Ra-226+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,3)
D-34				
D-34	Ra-226+D4 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(29,1)
D-34	Ra-226+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,2)
D-34	Ra-226+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(32,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(33,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(33,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(33,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(34,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(34,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(34,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(49,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(49,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(49,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(50,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(50,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(50,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(65,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(65,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(65,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(71,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(71,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(71,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(72,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(72,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(72,3)
D-34				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	U-238+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(87,1)
D-34	U-238+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(87,2)
D-34	U-238+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(87,3)
D-34				
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Ac-227+D1 , fish	1.500E+01	1.500E+01	BIOFAC(2,1)
D-5	Ac-227+D1 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Ac-227+D2 , fish	1.500E+01	1.500E+01	BIOFAC(3,1)
D-5	Ac-227+D2 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5				
D-5	Ac-227+D3 , fish	1.500E+01	1.500E+01	BIOFAC(4,1)
D-5	Ac-227+D3 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5				
D-5	Ac-227+D4 , fish	1.500E+01	1.500E+01	BIOFAC(5,1)
D-5	Ac-227+D4 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)
D-5				
D-5	Ac-227+D5 , fish	1.500E+01	1.500E+01	BIOFAC(6,1)
D-5	Ac-227+D5 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(13,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(13,2)
D-5				
D-5	Pb-210+D1 , fish	3.000E+02	3.000E+02	BIOFAC(14,1)
D-5	Pb-210+D1 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(14,2)
D-5				
D-5	Pb-210+D2 , fish	3.000E+02	3.000E+02	BIOFAC(15,1)
D-5	Pb-210+D2 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(15,2)
D-5				
D-5	Pb-210+D3 , fish	3.000E+02	3.000E+02	BIOFAC(16,1)
D-5	Pb-210+D3 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(16,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(17,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(17,2)
D-5				
D-5	Ra-226+D1 , fish	5.000E+01	5.000E+01	BIOFAC(20,1)
D-5	Ra-226+D1 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(20,2)
D-5				
D-5	Ra-226+D2 , fish	5.000E+01	5.000E+01	BIOFAC(23,1)
D-5	Ra-226+D2 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(23,2)
D-5				
D-5	Ra-226+D3 , fish	5.000E+01	5.000E+01	BIOFAC(26,1)
D-5	Ra-226+D3 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(26,2)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Adult)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D4 , fish	5.000E+01	5.000E+01	BIOFAC(29,1)
D-5	Ra-226+D4 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(29,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(32,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(32,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(33,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(33,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(34,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(34,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(49,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(49,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(50,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(50,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(65,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(65,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(71,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(71,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(72,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(72,2)
D-5				
D-5	U-238+D1 , fish	1.000E+01	1.000E+01	BIOFAC(87,1)
D-5	U-238+D1 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(87,2)
D-5				

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	7.000E-03	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.400E-02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pb-210	8.000E-03	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): Ra-226	7.000E-03	0.000E+00	---	S1(17)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.600E-04	0.000E+00	---	S1(32)
R012	Initial principal radionuclide (pCi/g): Th-228	1.000E-03	0.000E+00	---	S1(33)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(34)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E-03	0.000E+00	---	S1(49)
R012	Initial principal radionuclide (pCi/g): U-234	1.200E-02	0.000E+00	---	S1(50)
R012	Initial principal radionuclide (pCi/g): U-235	5.200E-04	0.000E+00	---	S1(65)
R012	Initial principal radionuclide (pCi/g): U-238	1.200E-02	0.000E+00	---	S1(71)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(17)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(32)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(33)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(34)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(49)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(50)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(65)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(71)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.497E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.109E-02	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(32)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(32,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(32)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(32)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(32)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(33)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(33,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(33)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(33)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(33)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(34)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(34,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(34)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(34)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(34)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(49)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(49,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(49)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(49)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(49)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(50)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(50,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(50)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(50)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(50)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(65)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(65,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(65)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(65)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(65)

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(71)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(71,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(71)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(71)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(71)
R017	Inhalation rate (m**3/yr)	4.836E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.550E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	7.990E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	4.380E+01	3.650E+01	---	SOIL

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Ac-227	7.000E-03
Thickness:	0.30 meters	Pa-231	1.400E-02
Cover Depth:	0.00 meters	Pb-210	8.000E-03
		Ra-226	7.000E-03
		Ra-228	3.600E-04
		Th-228	1.000E-03
		Th-230	1.000E+00
		Th-232	1.000E-03
		U-234	1.200E-02
		U-235	5.200E-04
		U-238	1.200E-02

0

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	7.331E-02	7.385E-02	7.533E-02	8.139E-02	9.535E-02	1.206E-01	1.319E-01	1.281E-01
M(t):	2.933E-03	2.954E-03	3.013E-03	3.256E-03	3.814E-03	4.824E-03	5.278E-03	5.125E-03

0Maximum TDOSE(t): 1.320E-01 mrem/yr at t = 325.4 ± 0.7 years
0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.254E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.453E-15	0.0000	6.554E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.875E-16	0.0000
Pa-231	3.961E-06	0.0000	3.357E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.469E-07	0.0000
Pb-210	2.084E-11	0.0000	8.529E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.866E-09	0.0000
Ra-226	1.150E-04	0.0009	7.809E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.069E-05	0.0001
Ra-228	1.097E-22	0.0000	1.591E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.983E-24	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.683E-02	0.6579	1.047E-02	0.0794	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.054E-02	0.2314
Th-232	3.872E-03	0.0293	1.672E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.152E-04	0.0009
U-234	4.294E-07	0.0000	6.087E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-07	0.0000
U-235	9.386E-08	0.0000	4.217E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.365E-09	0.0000
U-238	4.618E-07	0.0000	7.394E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.070E-08	0.0000
Total	9.082E-02	0.6882	1.049E-02	0.0795	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.066E-02	0.2323

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.254E+02 years

0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.706E-15	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.144E-06	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.896E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.258E-04	0.0010
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.278E-01	0.9687
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.004E-03	0.0303
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.943E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.665E-08	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.199E-07	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.541E-03	0.0619	1.212E-04	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.467E-04	0.0047
Pa-231	8.765E-04	0.0120	3.335E-04	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.010E-04	0.0109
Pb-210	1.985E-05	0.0003	8.131E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.779E-03	0.0243
Ra-226	2.294E-02	0.3130	6.969E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-04	0.0035
Ra-228	6.974E-04	0.0095	8.082E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.885E-05	0.0004
Th-228	2.376E-03	0.0324	3.758E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.427E-05	0.0002
Th-230	1.078E-03	0.0147	1.052E-02	0.1435	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.549E-02	0.3477
Th-232	1.109E-04	0.0015	1.152E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.240E-05	0.0004
U-234	1.401E-06	0.0000	1.156E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.997E-05	0.0010
U-235	1.244E-04	0.0017	4.510E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.881E-06	0.0000
U-238	6.206E-04	0.0085	9.886E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.783E-05	0.0009
Total	3.339E-02	0.4554	1.103E-02	0.1505	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.889E-02	0.3941

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.009E-03	0.0683
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.011E-03	0.0274
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.807E-03	0.0247
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.321E-02	0.3165
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.270E-04	0.0099
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.394E-03	0.0327
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-02	0.5060
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-04	0.0021
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.293E-05	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-04	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.983E-04	0.0095
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.331E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.163E-03	0.0564	1.111E-04	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-04	0.0043
Pa-231	1.131E-03	0.0153	3.335E-04	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.044E-04	0.0109
Pb-210	1.902E-05	0.0003	7.794E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.706E-03	0.0231
Ra-226	2.257E-02	0.3057	7.072E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.992E-04	0.0041
Ra-228	8.506E-04	0.0115	1.088E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.663E-05	0.0004
Th-228	1.653E-03	0.0224	2.615E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.930E-06	0.0001
Th-230	2.486E-03	0.0337	1.052E-02	0.1425	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.551E-02	0.3454
Th-232	3.733E-04	0.0051	1.184E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.170E-05	0.0006
U-234	1.370E-06	0.0000	1.131E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.844E-05	0.0009
U-235	1.217E-04	0.0016	4.414E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.819E-06	0.0000
U-238	6.070E-04	0.0082	9.670E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.635E-05	0.0009
Total	3.398E-02	0.4601	1.102E-02	0.1492	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.885E-02	0.3907

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.592E-03	0.0622
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.269E-03	0.0307
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.732E-03	0.0235
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-02	0.3098
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.783E-04	0.0119
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.666E-03	0.0226
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.852E-02	0.5216
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.269E-04	0.0058
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.112E-05	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.249E-04	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.830E-04	0.0092
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.385E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.500E-03	0.0465	9.343E-05	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.672E-04	0.0035
Pa-231	1.558E-03	0.0207	3.318E-04	0.0044	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.058E-04	0.0107
Pb-210	1.748E-05	0.0002	7.162E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-03	0.0208
Ra-226	2.185E-02	0.2901	7.247E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.775E-04	0.0050
Ra-228	9.118E-04	0.0121	1.246E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.186E-05	0.0003
Th-228	8.005E-04	0.0106	1.266E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.808E-06	0.0001
Th-230	5.235E-03	0.0695	1.052E-02	0.1397	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.555E-02	0.3392
Th-232	9.766E-04	0.0130	1.264E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.793E-05	0.0008
U-234	1.312E-06	0.0000	1.082E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.548E-05	0.0009
U-235	1.164E-04	0.0015	4.228E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.698E-06	0.0000
U-238	5.807E-04	0.0077	9.251E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.348E-05	0.0008
Total	3.555E-02	0.4719	1.100E-02	0.1460	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.879E-02	0.3821

0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
0 Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.860E-03	0.0512
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.696E-03	0.0358
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.592E-03	0.0211
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.224E-02	0.2952
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.349E-04	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.066E-04	0.0107
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.131E-02	0.5484
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.047E-03	0.0139
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.761E-05	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-04	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.535E-04	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.533E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.906E-03	0.0234	5.089E-05	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.455E-04	0.0018
Pa-231	2.409E-03	0.0296	3.128E-04	0.0038	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.721E-04	0.0095
Pb-210	1.300E-05	0.0002	5.326E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-03	0.0143
Ra-226	1.950E-02	0.2396	7.585E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.814E-04	0.0071
Ra-228	4.923E-04	0.0060	7.033E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.264E-06	0.0001
Th-228	6.323E-05	0.0008	1.000E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.799E-07	0.0000
Th-230	1.418E-02	0.1742	1.052E-02	0.1293	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.576E-02	0.3165
Th-232	2.658E-03	0.0327	1.501E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.277E-05	0.0011
U-234	1.131E-06	0.0000	9.274E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.610E-05	0.0007
U-235	9.972E-05	0.0012	3.638E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.315E-06	0.0000
U-238	4.974E-04	0.0061	7.924E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.437E-05	0.0007
Total	4.182E-02	0.5138	1.093E-02	0.1343	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.864E-02	0.3518

0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
0 Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-03	0.0258
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.494E-03	0.0429
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.184E-03	0.0145
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.009E-02	0.2468
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.022E-04	0.0062
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.371E-05	0.0008
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.046E-02	0.6200
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.766E-03	0.0340
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.651E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.024E-04	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.597E-04	0.0069
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.139E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.358E-04	0.0035	8.967E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.565E-05	0.0003
Pa-231	2.421E-03	0.0254	2.242E-04	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.626E-04	0.0059
Pb-210	5.578E-06	0.0001	2.285E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.000E-04	0.0052
Ra-226	1.409E-02	0.1477	7.118E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.786E-04	0.0082
Ra-228	3.453E-05	0.0004	4.972E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.199E-07	0.0000
Th-228	4.477E-08	0.0000	7.086E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.691E-10	0.0000
Th-230	3.476E-02	0.3646	1.053E-02	0.1104	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.663E-02	0.2793
Th-232	3.835E-03	0.0402	1.669E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.143E-04	0.0012
U-234	7.723E-07	0.0000	5.976E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.609E-05	0.0004
U-235	6.409E-05	0.0007	2.371E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.495E-06	0.0000
U-238	3.195E-04	0.0034	5.091E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.493E-05	0.0004
Total	5.587E-02	0.5859	1.080E-02	0.1132	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.868E-02	0.3008

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.705E-04	0.0039
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.208E-03	0.0336
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.079E-04	0.0053
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.487E-02	0.1560
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.520E-05	0.0004
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.511E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.192E-02	0.7543
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.966E-03	0.0416
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.283E-05	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.583E-05	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.595E-04	0.0038
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.535E-02	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.712E-07	0.0000	2.059E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.890E-08	0.0000
Pa-231	5.830E-04	0.0048	4.942E-05	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.247E-04	0.0010
Pb-210	2.886E-07	0.0000	1.182E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.587E-05	0.0002
Ra-226	4.510E-03	0.0374	2.925E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.904E-04	0.0032
Ra-228	2.467E-09	0.0000	3.557E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.433E-11	0.0000
Th-228	4.231E-19	0.0000	6.708E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.547E-21	0.0000
Th-230	7.102E-02	0.5889	1.053E-02	0.0873	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.922E-02	0.2423
Th-232	3.909E-03	0.0324	1.679E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.157E-04	0.0010
U-234	4.018E-07	0.0000	1.311E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.777E-06	0.0001
U-235	1.365E-05	0.0001	5.307E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.246E-07	0.0000
U-238	6.784E-05	0.0006	1.082E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.423E-06	0.0001
Total	8.010E-02	0.6642	1.060E-02	0.0879	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.989E-02	0.2479

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.507E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.571E-04	0.0063
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-05	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.903E-03	0.0407
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.514E-09	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.263E-19	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.108E-01	0.9185
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.041E-03	0.0335
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.490E-06	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-05	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.634E-05	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.206E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.225E-14	0.0000	5.943E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-15	0.0000
Pa-231	6.953E-06	0.0001	5.892E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.486E-06	0.0000
Pb-210	6.102E-11	0.0000	2.498E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.467E-09	0.0000
Ra-226	1.739E-04	0.0013	1.180E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-05	0.0001
Ra-228	3.506E-21	0.0000	5.081E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.332E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.671E-02	0.6572	1.048E-02	0.0794	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.054E-02	0.2314
Th-232	3.876E-03	0.0294	1.673E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.152E-04	0.0009
U-234	4.271E-07	0.0000	6.737E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.432E-07	0.0000
U-235	1.645E-07	0.0000	7.280E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.118E-09	0.0000
U-238	8.103E-07	0.0000	1.296E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.891E-08	0.0000
Total	9.077E-02	0.6880	1.050E-02	0.0796	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.067E-02	0.2325

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.454E-14	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.029E-06	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.553E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.902E-04	0.0014
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.575E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-01	0.9681
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.008E-03	0.0304
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.377E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.694E-07	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.121E-07	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.279E-12	0.0000	1.089E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.747E-13	0.0000
Pb-210	8.382E-24	0.0000	3.428E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.502E-22	0.0000
Ra-226	1.945E-09	0.0000	1.347E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.845E-10	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.396E-02	0.6553	1.028E-02	0.0802	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.001E-02	0.2342
Th-232	3.739E-03	0.0292	1.652E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-04	0.0009
U-234	4.192E-07	0.0000	5.132E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-07	0.0000
U-235	3.154E-14	0.0000	1.969E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.246E-16	0.0000
U-238	5.370E-11	0.0000	6.559E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.916E-11	0.0000
Total	8.770E-02	0.6845	1.030E-02	0.0804	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.013E-02	0.2351

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.662E-12	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.620E-22	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.131E-09	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.243E-01	0.9698
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.869E-03	0.0302
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.203E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.266E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.942E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-01	1.0000

*Sum of all water independent and dependent pathways.

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227+D	Ac-227+D	9.835E-01	7.054E-01	6.467E-01	5.436E-01	2.961E-01	5.217E-02	1.198E-04	3.456E-12	1.405E-38
0Ac-227+D1	Ac-227+D1	2.722E-03	1.971E-03	1.807E-03	1.519E-03	8.275E-04	1.458E-04	3.348E-07	9.658E-15	3.925E-41
0Ac-227+D2	Ac-227+D2	1.376E-02	8.161E-03	7.482E-03	6.290E-03	3.426E-03	6.036E-04	1.386E-06	3.998E-14	1.625E-40
0Ac-227+D3	Ac-227+D3	3.809E-05	2.285E-05	2.095E-05	1.761E-05	9.593E-06	1.690E-06	3.882E-09	1.120E-16	4.554E-43
0Ac-227+D4	Ac-227+D4	8.257E-07	6.025E-07	5.524E-07	4.644E-07	2.529E-07	4.456E-08	1.023E-10	2.948E-18	1.121E-44
0Ac-227+D5	Ac-227+D5	2.285E-09	1.684E-09	1.544E-09	1.298E-09	7.067E-10	1.245E-10	2.859E-13	8.237E-21	0.000E+00
0Pa-231	Pa-231	9.835E-01	1.300E-01	1.271E-01	1.216E-01	1.042E-01	6.689E-02	1.419E-02	1.691E-04	3.120E-11
Pa-231	Ac-227+D	9.835E-01	1.131E-02	3.233E-02	6.788E-02	1.416E-01	1.588E-01	3.909E-02	4.663E-04	8.578E-11
Pa-231	ΣDSR(j)		1.413E-01	1.595E-01	1.895E-01	2.457E-01	2.257E-01	5.328E-02	6.354E-04	1.170E-10
0Pa-231	Pa-231	2.722E-03	3.598E-04	3.519E-04	3.367E-04	2.883E-04	1.851E-04	3.928E-05	4.680E-07	8.634E-14
Pa-231	Ac-227+D1	2.722E-03	3.160E-05	9.035E-05	1.897E-04	3.957E-04	4.439E-04	1.092E-04	1.303E-06	2.397E-13
Pa-231	ΣDSR(j)		3.914E-04	4.422E-04	5.264E-04	6.840E-04	6.290E-04	1.485E-04	1.771E-06	3.260E-13
0Pa-231	Pa-231	1.376E-02	1.819E-03	1.779E-03	1.702E-03	1.458E-03	9.359E-04	1.986E-04	2.366E-06	4.365E-13
Pa-231	Ac-227+D2	1.376E-02	1.308E-04	3.740E-04	7.854E-04	1.638E-03	1.838E-03	4.522E-04	5.394E-06	9.919E-13
Pa-231	ΣDSR(j)		1.950E-03	2.153E-03	2.487E-03	3.096E-03	2.774E-03	6.508E-04	7.760E-06	1.428E-12
0Pa-231	Pa-231	3.809E-05	5.034E-06	4.924E-06	4.711E-06	4.034E-06	2.590E-06	5.495E-07	6.548E-09	1.208E-15
Pa-231	Ac-227+D3	3.809E-05	3.663E-07	1.047E-06	2.199E-06	4.587E-06	5.146E-06	1.266E-06	1.511E-08	2.777E-15
Pa-231	ΣDSR(j)		5.400E-06	5.971E-06	6.910E-06	8.621E-06	7.737E-06	1.816E-06	2.165E-08	3.985E-15
0Pa-231	Pa-231	8.257E-07	1.091E-07	1.068E-07	1.021E-07	8.746E-08	5.616E-08	1.191E-08	1.420E-10	2.619E-17
Pa-231	Ac-227+D4	8.257E-07	9.658E-09	2.762E-08	5.798E-08	1.209E-07	1.357E-07	3.337E-08	3.978E-10	7.282E-17
Pa-231	ΣDSR(j)		1.188E-07	1.344E-07	1.601E-07	2.084E-07	1.918E-07	4.529E-08	5.397E-10	9.902E-17
0Pa-231	Pa-231	2.285E-09	3.021E-10	2.955E-10	2.826E-10	2.421E-10	1.554E-10	3.297E-11	3.929E-13	7.249E-20
Pa-231	Ac-227+D5	2.285E-09	2.699E-11	7.717E-11	1.620E-10	3.379E-10	3.791E-10	9.326E-11	1.111E-12	2.035E-19
Pa-231	ΣDSR(j)		3.291E-10	3.726E-10	4.447E-10	5.800E-10	5.345E-10	1.262E-10	1.504E-12	2.760E-19
0Pb-210+D	Pb-210+D	1.000E+00	2.259E-01	2.166E-01	1.990E-01	1.480E-01	6.349E-02	3.284E-03	6.941E-07	9.525E-20
0Pb-210+D1	Pb-210+D1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D2	Pb-210+D2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D3	Pb-210+D3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Ra-226+D	Ra-226+D	9.996E-01	3.309E+00	3.256E+00	3.152E+00	2.812E+00	2.031E+00	6.500E-01	2.506E-02	2.804E-07
Ra-226+D	Pb-210+D1	9.996E-01	3.531E-03	1.032E-02	2.274E-02	5.576E-02	9.229E-02	5.001E-02	2.088E-03	2.384E-08
Ra-226+D	ΣDSR(j)		3.313E+00	3.266E+00	3.174E+00	2.868E+00	2.123E+00	7.000E-01	2.715E-02	3.042E-07

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D	Ra-226+D	1.319E-06	4.368E-06	4.298E-06	4.160E-06	3.712E-06	2.681E-06	8.580E-07	3.308E-08	3.701E-13
Ra-226+D	Pb-210+D2	1.319E-06	1.825E-09	5.335E-09	1.175E-08	2.882E-08	4.770E-08	2.585E-08	1.079E-09	1.232E-14
Ra-226+D	ΣDSR(j)		4.370E-06	4.303E-06	4.172E-06	3.741E-06	2.729E-06	8.838E-07	3.416E-08	3.824E-13
0Ra-226+D	Ra-226+D	1.899E-08	6.288E-08	6.186E-08	5.988E-08	5.343E-08	3.859E-08	1.235E-08	4.762E-10	5.327E-15
Ra-226+D	Pb-210+D3	1.899E-08	8.409E-11	2.458E-10	5.416E-10	1.328E-09	2.198E-09	1.191E-09	4.969E-11	5.653E-16
Ra-226+D	ΣDSR(j)		6.296E-08	6.211E-08	6.042E-08	5.476E-08	4.079E-08	1.354E-08	5.259E-10	5.892E-15
0Ra-226+D1	Ra-226+D1	2.100E-04	1.800E-03	1.771E-03	1.714E-03	1.529E-03	1.104E-03	3.535E-04	1.363E-05	1.524E-10
Ra-226+D1	Pb-210+D1	2.100E-04	7.417E-07	2.168E-06	4.777E-06	1.171E-05	1.938E-05	1.050E-05	4.385E-07	5.008E-12
Ra-226+D1	ΣDSR(j)		1.800E-03	1.773E-03	1.719E-03	1.541E-03	1.124E-03	3.640E-04	1.407E-05	1.574E-10
0Ra-226+D1	Ra-226+D1	2.771E-10	2.376E-09	2.337E-09	2.262E-09	2.019E-09	1.458E-09	4.666E-10	1.799E-11	2.012E-16
Ra-226+D1	Pb-210+D2	2.771E-10	3.833E-13	1.121E-12	2.469E-12	6.053E-12	1.002E-11	5.430E-12	2.267E-13	2.589E-18
Ra-226+D1	ΣDSR(j)		2.376E-09	2.338E-09	2.265E-09	2.025E-09	1.468E-09	4.720E-10	1.822E-11	2.038E-16
0Ra-226+D1	Ra-226+D1	3.989E-12	3.419E-11	3.364E-11	3.256E-11	2.906E-11	2.098E-11	6.716E-12	2.590E-13	2.896E-18
Ra-226+D1	Pb-210+D3	3.989E-12	1.766E-14	5.163E-14	1.138E-13	2.789E-13	4.616E-13	2.501E-13	1.044E-14	1.187E-19
Ra-226+D1	ΣDSR(j)		3.421E-11	3.369E-11	3.268E-11	2.934E-11	2.145E-11	6.966E-12	2.694E-13	3.014E-18
0Ra-226+D2	Ra-226+D2	1.998E-04	5.797E-04	5.704E-04	5.521E-04	4.926E-04	3.558E-04	1.138E-04	4.388E-06	4.898E-11
Ra-226+D2	Pb-210+D1	1.998E-04	7.056E-07	2.063E-06	4.545E-06	1.114E-05	1.844E-05	9.994E-06	4.172E-07	4.764E-12
Ra-226+D2	ΣDSR(j)		5.804E-04	5.724E-04	5.566E-04	5.038E-04	3.742E-04	1.238E-04	4.805E-06	5.374E-11
0Ra-226+D2	Ra-226+D2	2.637E-10	7.652E-10	7.529E-10	7.288E-10	6.503E-10	4.696E-10	1.503E-10	5.792E-12	6.465E-17
Ra-226+D2	Pb-210+D2	2.637E-10	3.647E-13	1.066E-12	2.349E-12	5.759E-12	9.533E-12	5.166E-12	2.156E-13	2.463E-18
Ra-226+D2	ΣDSR(j)		7.656E-10	7.540E-10	7.311E-10	6.561E-10	4.791E-10	1.554E-10	6.007E-12	6.712E-17
0Ra-226+D2	Ra-226+D2	3.795E-12	1.101E-11	1.084E-11	1.049E-11	9.360E-12	6.759E-12	2.163E-12	8.336E-14	9.306E-19
Ra-226+D2	Pb-210+D3	3.795E-12	1.680E-14	4.912E-14	1.082E-13	2.654E-13	4.392E-13	2.380E-13	9.929E-15	1.130E-19
Ra-226+D2	ΣDSR(j)		1.103E-11	1.089E-11	1.060E-11	9.626E-12	7.199E-12	2.401E-12	9.329E-14	1.044E-18
0Ra-226+D3	Ra-226+D3	4.196E-08	3.425E-07	3.370E-07	3.262E-07	2.911E-07	2.102E-07	6.727E-08	2.593E-09	2.897E-14
Ra-226+D3	Pb-210+D1	4.196E-08	1.482E-10	4.333E-10	9.546E-10	2.341E-09	3.874E-09	2.099E-09	8.763E-11	1.001E-15
Ra-226+D3	ΣDSR(j)		3.427E-07	3.374E-07	3.271E-07	2.934E-07	2.141E-07	6.937E-08	2.681E-09	2.998E-14
0Ra-226+D3	Ra-226+D3	5.538E-14	4.521E-13	4.448E-13	4.306E-13	3.842E-13	2.775E-13	8.879E-14	3.423E-15	3.825E-20
Ra-226+D3	Pb-210+D2	5.538E-14	7.661E-17	2.239E-16	4.934E-16	1.210E-15	2.002E-15	1.085E-15	4.529E-17	5.173E-22
Ra-226+D3	ΣDSR(j)		4.522E-13	4.450E-13	4.311E-13	3.854E-13	2.795E-13	8.988E-14	3.468E-15	3.876E-20
0Ra-226+D3	Ra-226+D3	7.972E-16	6.508E-15	6.403E-15	6.198E-15	5.530E-15	3.994E-15	1.278E-15	4.927E-17	5.505E-22
Ra-226+D3	Pb-210+D3	7.972E-16	3.530E-18	1.032E-17	2.273E-17	5.574E-17	9.225E-17	4.998E-17	2.086E-18	2.373E-23
Ra-226+D3	ΣDSR(j)		6.511E-15	6.413E-15	6.220E-15	5.586E-15	4.086E-15	1.328E-15	5.136E-17	5.743E-22
0Ra-226+D4	Ra-226+D4	2.000E-07	9.330E-09	9.179E-09	8.886E-09	7.930E-09	5.729E-09	1.836E-09	7.107E-11	8.107E-16
Ra-226+D4	Pb-210+D1	2.000E-07	7.065E-10	2.065E-09	4.550E-09	1.116E-08	1.847E-08	1.001E-08	4.177E-10	4.770E-15
Ra-226+D4	ΣDSR(j)		1.004E-08	1.124E-08	1.344E-08	1.909E-08	2.419E-08	1.184E-08	4.888E-10	5.581E-15

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D4	Ra-226+D4	2.640E-13	1.232E-14	1.212E-14	1.173E-14	1.047E-14	7.562E-15	2.423E-15	9.381E-17	1.070E-21
Ra-226+D4	Pb-210+D2	2.640E-13	3.652E-16	1.067E-15	2.352E-15	5.766E-15	9.544E-15	5.172E-15	2.159E-16	2.466E-21
Ra-226+D4	ΣDSR(j)		1.268E-14	1.318E-14	1.408E-14	1.623E-14	1.711E-14	7.595E-15	3.097E-16	3.536E-21
0Ra-226+D4	Ra-226+D4	3.800E-15	1.773E-16	1.744E-16	1.688E-16	1.507E-16	1.088E-16	3.488E-17	1.350E-18	1.540E-23
Ra-226+D4	Pb-210+D3	3.800E-15	1.682E-17	4.918E-17	1.084E-16	2.657E-16	4.397E-16	2.383E-16	9.941E-18	1.131E-22
Ra-226+D4	ΣDSR(j)		1.941E-16	2.236E-16	2.772E-16	4.163E-16	5.486E-16	2.731E-16	1.129E-17	1.285E-22
0Ra-228+D	Ra-228+D	1.000E+00	1.580E+00	1.379E+00	1.050E+00	4.040E-01	2.641E-02	1.886E-06	2.686E-18	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	4.394E-01	1.061E+00	1.548E+00	9.911E-01	7.137E-02	5.098E-06	7.243E-18	0.000E+00
Ra-228+D	ΣDSR(j)		2.019E+00	2.440E+00	2.597E+00	1.395E+00	9.778E-02	6.984E-06	9.930E-18	0.000E+00
0Th-228+D	Th-228+D	1.000E+00	2.394E+00	1.666E+00	8.066E-01	6.371E-02	4.511E-05	4.263E-16	0.000E+00	0.000E+00
0Th-230	Th-230	9.996E-01	3.636E-02	3.636E-02	3.636E-02	3.635E-02	3.633E-02	3.626E-02	3.606E-02	3.537E-02
Th-230	Ra-226+D	9.996E-01	7.188E-04	2.141E-03	4.916E-03	1.395E-02	3.472E-02	7.130E-02	8.714E-02	8.439E-02
Th-230	Pb-210+D1	9.996E-01	5.124E-07	3.527E-06	1.796E-05	1.407E-04	8.278E-04	3.134E-03	4.452E-03	4.422E-03
Th-230	ΣDSR(j)		3.708E-02	3.850E-02	4.129E-02	5.044E-02	7.188E-02	1.107E-01	1.277E-01	1.242E-01
0Th-230	Th-230	1.319E-06	4.800E-08	4.799E-08	4.799E-08	4.798E-08	4.796E-08	4.786E-08	4.760E-08	4.668E-08
Th-230	Ra-226+D	1.319E-06	9.488E-10	2.826E-09	6.489E-09	1.841E-08	4.583E-08	9.412E-08	1.150E-07	1.114E-07
Th-230	Pb-210+D2	1.319E-06	2.648E-13	1.823E-12	9.282E-12	7.274E-11	4.279E-10	1.620E-09	2.302E-09	2.286E-09
Th-230	ΣDSR(j)		4.894E-08	5.082E-08	5.449E-08	6.646E-08	9.422E-08	1.436E-07	1.649E-07	1.604E-07
0Th-230	Th-230	1.899E-08	6.908E-10	6.908E-10	6.908E-10	6.906E-10	6.903E-10	6.889E-10	6.851E-10	6.720E-10
Th-230	Ra-226+D	1.899E-08	1.366E-11	4.067E-11	9.341E-11	2.650E-10	6.597E-10	1.355E-09	1.656E-09	1.603E-09
Th-230	Pb-210+D3	1.899E-08	1.220E-14	8.400E-14	4.277E-13	3.351E-12	1.971E-11	7.462E-11	1.060E-10	1.048E-10
Th-230	ΣDSR(j)		7.045E-10	7.316E-10	7.846E-10	9.590E-10	1.370E-09	2.118E-09	2.447E-09	2.380E-09
0Th-230	Th-230	2.100E-04	7.637E-06	7.637E-06	7.637E-06	7.635E-06	7.631E-06	7.616E-06	7.574E-06	7.428E-06
Th-230	Ra-226+D1	2.100E-04	3.909E-07	1.164E-06	2.673E-06	7.584E-06	1.888E-05	3.877E-05	4.739E-05	4.587E-05
Th-230	Pb-210+D1	2.100E-04	1.076E-10	7.409E-10	3.772E-09	2.956E-08	1.739E-07	6.582E-07	9.352E-07	9.287E-07
Th-230	ΣDSR(j)		8.028E-06	8.802E-06	1.031E-05	1.525E-05	2.669E-05	4.705E-05	5.589E-05	5.423E-05
0Th-230	Th-230	2.771E-10	1.008E-11	1.008E-11	1.008E-11	1.008E-11	1.007E-11	1.005E-11	9.998E-12	9.806E-12
Th-230	Ra-226+D1	2.771E-10	5.160E-13	1.537E-12	3.529E-12	1.001E-11	2.493E-11	5.118E-11	6.255E-11	6.055E-11
Th-230	Pb-210+D2	2.771E-10	5.563E-17	3.830E-16	1.950E-15	1.528E-14	8.987E-14	3.402E-13	4.834E-13	4.801E-13
Th-230	ΣDSR(j)		1.060E-11	1.162E-11	1.361E-11	2.010E-11	3.509E-11	6.157E-11	7.303E-11	7.084E-11
0Th-230	Th-230	3.989E-12	1.451E-13	1.451E-13	1.451E-13	1.451E-13	1.450E-13	1.447E-13	1.439E-13	1.411E-13
Th-230	Ra-226+D1	3.989E-12	7.427E-15	2.212E-14	5.080E-14	1.441E-13	3.588E-13	7.367E-13	9.003E-13	8.716E-13
Th-230	Pb-210+D3	3.989E-12	2.563E-18	1.764E-17	8.983E-17	7.039E-16	4.141E-15	1.567E-14	2.226E-14	2.202E-14
Th-230	ΣDSR(j)		1.525E-13	1.672E-13	1.960E-13	2.899E-13	5.079E-13	8.971E-13	1.066E-12	1.035E-12

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.998E-04	7.266E-06	7.266E-06	7.266E-06	7.264E-06	7.260E-06	7.246E-06	7.206E-06	7.068E-06
Th-230	Ra-226+D2	1.998E-04	1.259E-07	3.750E-07	8.612E-07	2.443E-06	6.082E-06	1.249E-05	1.525E-05	1.474E-05
Th-230	Pb-210+D1	1.998E-04	1.024E-10	7.049E-10	3.589E-09	2.812E-08	1.654E-07	6.262E-07	8.898E-07	8.836E-07
Th-230	ΣDSR(j)		7.392E-06	7.642E-06	8.130E-06	9.735E-06	1.351E-05	2.036E-05	2.335E-05	2.269E-05
0Th-230	Th-230	2.637E-10	9.591E-12	9.591E-12	9.591E-12	9.589E-12	9.583E-12	9.565E-12	9.512E-12	9.329E-12
Th-230	Ra-226+D2	2.637E-10	1.662E-13	4.950E-13	1.137E-12	3.225E-12	8.029E-12	1.648E-11	2.014E-11	1.946E-11
Th-230	Pb-210+D2	2.637E-10	5.292E-17	3.644E-16	1.855E-15	1.454E-14	8.550E-14	3.237E-13	4.599E-13	4.568E-13
Th-230	ΣDSR(j)		9.758E-12	1.009E-11	1.073E-11	1.283E-11	1.770E-11	2.637E-11	3.011E-11	2.925E-11
0Th-230	Th-230	3.795E-12	1.381E-13	1.381E-13	1.380E-13	1.380E-13	1.379E-13	1.377E-13	1.369E-13	1.343E-13
Th-230	Ra-226+D2	3.795E-12	2.392E-15	7.125E-15	1.636E-14	4.642E-14	1.156E-13	2.373E-13	2.898E-13	2.801E-13
Th-230	Pb-210+D3	3.795E-12	2.439E-18	1.679E-17	8.547E-17	6.697E-16	3.939E-15	1.491E-14	2.118E-14	2.095E-14
Th-230	ΣDSR(j)		1.405E-13	1.452E-13	1.545E-13	1.851E-13	2.574E-13	3.899E-13	4.479E-13	4.353E-13
0Th-230	Th-230	4.196E-08	1.526E-09	1.526E-09	1.526E-09	1.526E-09	1.525E-09	1.522E-09	1.514E-09	1.485E-09
Th-230	Ra-226+D3	4.196E-08	7.439E-11	2.216E-10	5.088E-10	1.443E-09	3.594E-09	7.379E-09	9.016E-09	8.721E-09
Th-230	Pb-210+D1	4.196E-08	2.151E-14	1.481E-13	7.538E-13	5.907E-12	3.475E-11	1.315E-10	1.869E-10	1.856E-10
Th-230	ΣDSR(j)		1.601E-09	1.748E-09	2.036E-09	2.975E-09	5.153E-09	9.032E-09	1.072E-08	1.039E-08
0Th-230	Th-230	5.538E-14	2.015E-15	2.015E-15	2.014E-15	2.014E-15	2.013E-15	2.009E-15	1.998E-15	1.960E-15
Th-230	Ra-226+D3	5.538E-14	9.820E-17	2.925E-16	6.716E-16	1.905E-15	4.744E-15	9.740E-15	1.190E-14	1.151E-14
Th-230	Pb-210+D2	5.538E-14	1.112E-20	7.653E-20	3.896E-19	3.053E-18	1.796E-17	6.799E-17	9.661E-17	9.595E-17
Th-230	ΣDSR(j)		2.113E-15	2.307E-15	2.686E-15	3.922E-15	6.774E-15	1.182E-14	1.400E-14	1.357E-14
0Th-230	Th-230	7.972E-16	2.900E-17	2.900E-17	2.900E-17	2.899E-17	2.897E-17	2.892E-17	2.876E-17	2.821E-17
Th-230	Ra-226+D3	7.972E-16	1.413E-18	4.210E-18	9.667E-18	2.742E-17	6.828E-17	1.402E-16	1.713E-16	1.657E-16
Th-230	Pb-210+D3	7.972E-16	5.122E-22	3.526E-21	1.795E-20	1.407E-19	8.275E-19	3.132E-18	4.448E-18	4.401E-18
Th-230	ΣDSR(j)		3.041E-17	3.321E-17	3.868E-17	5.656E-17	9.808E-17	1.722E-16	2.045E-16	1.983E-16
0Th-230	Th-230	2.000E-07	7.275E-09	7.275E-09	7.274E-09	7.273E-09	7.269E-09	7.255E-09	7.215E-09	7.076E-09
Th-230	Ra-226+D4	2.000E-07	2.026E-12	6.035E-12	1.386E-11	3.932E-11	9.794E-11	2.014E-10	2.471E-10	2.440E-10
Th-230	Pb-210+D1	2.000E-07	1.025E-13	7.058E-13	3.593E-12	2.816E-11	1.656E-10	6.270E-10	8.909E-10	8.847E-10
Th-230	ΣDSR(j)		7.277E-09	7.281E-09	7.292E-09	7.340E-09	7.532E-09	8.083E-09	8.353E-09	8.205E-09
0Th-230	Th-230	2.640E-13	9.603E-15	9.603E-15	9.602E-15	9.600E-15	9.595E-15	9.576E-15	9.523E-15	9.341E-15
Th-230	Ra-226+D4	2.640E-13	2.675E-18	7.967E-18	1.830E-17	5.191E-17	1.293E-16	2.658E-16	3.261E-16	3.221E-16
Th-230	Pb-210+D2	2.640E-13	5.299E-20	3.648E-19	1.857E-18	1.455E-17	8.561E-17	3.241E-16	4.605E-16	4.573E-16
Th-230	ΣDSR(j)		9.606E-15	9.611E-15	9.622E-15	9.667E-15	9.810E-15	1.017E-14	1.031E-14	1.012E-14
0Th-230	Th-230	3.800E-15	1.382E-16	1.382E-16	1.382E-16	1.382E-16	1.381E-16	1.378E-16	1.371E-16	1.344E-16
Th-230	Ra-226+D4	3.800E-15	3.850E-20	1.147E-19	2.633E-19	7.472E-19	1.861E-18	3.826E-18	4.695E-18	4.637E-18
Th-230	Pb-210+D3	3.800E-15	2.441E-21	1.681E-20	8.557E-20	6.706E-19	3.944E-18	1.493E-17	2.120E-17	2.098E-17
Th-230	ΣDSR(j)		1.383E-16	1.384E-16	1.386E-16	1.396E-16	1.439E-16	1.566E-16	1.630E-16	1.601E-16

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 28
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	3.907E-02	3.907E-02	3.907E-02	3.906E-02	3.905E-02	3.900E-02	3.885E-02	3.835E-02
Th-232	Ra-228+D	1.000E+00	9.740E-02	2.755E-01	5.663E-01	1.137E+00	1.470E+00	1.490E+00	1.480E+00	1.437E+00
Th-232	Th-228+D	1.000E+00	1.839E-02	1.123E-01	4.418E-01	1.590E+00	2.457E+00	2.512E+00	2.490E+00	2.394E+00
Th-232	ΣDSR(j)		1.549E-01	4.269E-01	1.047E+00	2.766E+00	3.966E+00	4.041E+00	4.008E+00	3.869E+00
0U-234	U-234	9.996E-01	6.908E-03	6.756E-03	6.464E-03	5.536E-03	3.556E-03	7.555E-04	9.037E-06	1.691E-12
U-234	Th-230	9.996E-01	1.659E-07	4.930E-07	1.126E-06	3.132E-06	7.412E-06	1.345E-05	1.498E-05	1.471E-05
U-234	Ra-226+D	9.996E-01	2.194E-09	1.519E-08	7.833E-08	6.415E-07	4.225E-06	2.077E-05	3.562E-05	3.511E-05
U-234	Pb-210+D1	9.996E-01	1.176E-12	1.734E-11	1.947E-10	4.497E-09	7.487E-08	7.975E-07	1.802E-06	1.840E-06
U-234	ΣDSR(j)		6.908E-03	6.757E-03	6.465E-03	5.540E-03	3.568E-03	7.905E-04	6.144E-05	5.166E-05
0U-234	U-234	1.319E-06	9.118E-09	8.919E-09	8.532E-09	7.308E-09	4.694E-09	9.972E-10	1.193E-11	2.233E-18
U-234	Th-230	1.319E-06	2.190E-13	6.507E-13	1.486E-12	4.134E-12	9.784E-12	1.775E-11	1.978E-11	1.942E-11
U-234	Ra-226+D	1.319E-06	2.896E-15	2.005E-14	1.034E-13	8.468E-13	5.576E-12	2.742E-11	4.701E-11	4.634E-11
U-234	Pb-210+D2	1.319E-06	6.079E-19	8.963E-18	1.006E-16	2.324E-15	3.870E-14	4.122E-13	9.317E-13	9.510E-13
U-234	ΣDSR(j)		9.118E-09	8.919E-09	8.534E-09	7.313E-09	4.710E-09	1.043E-09	7.965E-11	6.672E-11
0U-234	U-234	1.899E-08	1.312E-10	1.284E-10	1.228E-10	1.052E-10	6.757E-11	1.435E-11	1.717E-13	3.214E-20
U-234	Th-230	1.899E-08	3.153E-15	9.367E-15	2.139E-14	5.951E-14	1.408E-13	2.555E-13	2.847E-13	2.796E-13
U-234	Ra-226+D	1.899E-08	4.168E-17	2.886E-16	1.488E-15	1.219E-14	8.027E-14	3.946E-13	6.767E-13	6.671E-13
U-234	Pb-210+D3	1.899E-08	2.801E-20	4.130E-19	4.636E-18	1.071E-16	1.783E-15	1.899E-14	4.290E-14	4.362E-14
U-234	ΣDSR(j)		1.312E-10	1.284E-10	1.228E-10	1.053E-10	6.779E-11	1.502E-11	1.176E-12	9.902E-13
0U-234	U-234	2.100E-04	1.451E-06	1.419E-06	1.358E-06	1.163E-06	7.470E-07	1.587E-07	1.898E-09	3.553E-16
U-234	Th-230	2.100E-04	3.486E-11	1.035E-10	2.364E-10	6.578E-10	1.557E-09	2.825E-09	3.147E-09	3.090E-09
U-234	Ra-226+D1	2.100E-04	1.193E-12	8.261E-12	4.260E-11	3.489E-10	2.297E-09	1.130E-08	1.937E-08	1.908E-08
U-234	Pb-210+D1	2.100E-04	2.470E-16	3.643E-15	4.089E-14	9.446E-13	1.573E-11	1.675E-10	3.786E-10	3.864E-10
U-234	ΣDSR(j)		1.451E-06	1.419E-06	1.358E-06	1.164E-06	7.508E-07	1.730E-07	2.479E-08	2.256E-08
0U-234	U-234	2.771E-10	1.915E-12	1.873E-12	1.792E-12	1.535E-12	9.860E-13	2.095E-13	2.505E-15	4.689E-22
U-234	Th-230	2.771E-10	4.601E-17	1.367E-16	3.121E-16	8.683E-16	2.055E-15	3.729E-15	4.154E-15	4.079E-15
U-234	Ra-226+D1	2.771E-10	1.575E-18	1.090E-17	5.623E-17	4.605E-16	3.033E-15	1.491E-14	2.556E-14	2.519E-14
U-234	Pb-210+D2	2.771E-10	1.277E-22	1.883E-21	2.114E-20	4.882E-19	8.128E-18	8.659E-17	1.957E-16	1.997E-16
U-234	ΣDSR(j)		1.915E-12	1.873E-12	1.793E-12	1.536E-12	9.911E-13	2.282E-13	3.242E-14	2.947E-14
0U-234	U-234	3.989E-12	2.757E-14	2.696E-14	2.580E-14	2.209E-14	1.419E-14	3.015E-15	3.606E-17	6.750E-24
U-234	Th-230	3.989E-12	6.623E-19	1.967E-18	4.492E-18	1.250E-17	2.958E-17	5.367E-17	5.979E-17	5.872E-17
U-234	Ra-226+D1	3.989E-12	2.267E-20	1.570E-19	8.093E-19	6.628E-18	4.365E-17	2.146E-16	3.680E-16	3.626E-16
U-234	Pb-210+D3	3.989E-12	5.883E-24	8.674E-23	9.738E-22	2.249E-20	3.745E-19	3.989E-18	9.011E-18	9.161E-18
U-234	ΣDSR(j)		2.757E-14	2.697E-14	2.580E-14	2.211E-14	1.427E-14	3.287E-15	4.728E-16	4.305E-16
0U-234	U-234	1.998E-04	1.380E-06	1.350E-06	1.292E-06	1.106E-06	7.107E-07	1.510E-07	1.806E-09	3.380E-16
U-234	Th-230	1.998E-04	3.316E-11	9.852E-11	2.250E-10	6.259E-10	1.481E-09	2.688E-09	2.994E-09	2.940E-09
U-234	Ra-226+D2	1.998E-04	3.843E-13	2.661E-12	1.372E-11	1.124E-10	7.400E-10	3.638E-09	6.235E-09	6.133E-09
U-234	Pb-210+D1	1.998E-04	2.350E-16	3.466E-15	3.891E-14	8.987E-13	1.496E-11	1.594E-10	3.602E-10	3.676E-10
U-234	ΣDSR(j)		1.380E-06	1.350E-06	1.292E-06	1.107E-06	7.129E-07	1.575E-07	1.139E-08	9.441E-09

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.637E-10	1.822E-12	1.782E-12	1.705E-12	1.460E-12	9.381E-13	1.993E-13	2.384E-15	4.462E-22
U-234	Th-230	2.637E-10	4.377E-17	1.300E-16	2.969E-16	8.262E-16	1.955E-15	3.548E-15	3.952E-15	3.881E-15
U-234	Ra-226+D2	2.637E-10	5.073E-19	3.512E-18	1.811E-17	1.483E-16	9.768E-16	4.802E-15	8.230E-15	8.096E-15
U-234	Pb-210+D2	2.637E-10	1.215E-22	1.791E-21	2.011E-20	4.645E-19	7.733E-18	8.238E-17	1.862E-16	1.900E-16
U-234	ΣDSR(j)		1.822E-12	1.782E-12	1.705E-12	1.461E-12	9.411E-13	2.077E-13	1.475E-14	1.217E-14
0U-234	U-234	3.795E-12	2.623E-14	2.565E-14	2.454E-14	2.102E-14	1.350E-14	2.869E-15	3.431E-17	6.422E-24
U-234	Th-230	3.795E-12	6.301E-19	1.872E-18	4.274E-18	1.189E-17	2.814E-17	5.106E-17	5.689E-17	5.587E-17
U-234	Ra-226+D2	3.795E-12	7.302E-21	5.056E-20	2.607E-19	2.135E-18	1.406E-17	6.912E-17	1.185E-16	1.165E-16
U-234	Pb-210+D3	3.795E-12	5.597E-24	8.253E-23	9.265E-22	2.140E-20	3.563E-19	3.795E-18	8.573E-18	8.716E-18
U-234	ΣDSR(j)		2.623E-14	2.566E-14	2.455E-14	2.104E-14	1.355E-14	2.992E-15	2.182E-16	1.811E-16
0U-234	U-234	4.196E-08	2.899E-10	2.836E-10	2.713E-10	2.324E-10	1.493E-10	3.171E-11	3.793E-13	7.099E-20
U-234	Th-230	4.196E-08	6.966E-15	2.069E-14	4.725E-14	1.315E-13	3.111E-13	5.645E-13	6.289E-13	6.176E-13
U-234	Ra-226+D3	4.196E-08	2.271E-16	1.572E-15	8.106E-15	6.639E-14	4.372E-13	2.149E-12	3.685E-12	3.628E-12
U-234	Pb-210+D1	4.196E-08	4.937E-20	7.279E-19	8.172E-18	1.888E-16	3.143E-15	3.348E-14	7.566E-14	7.721E-14
U-234	ΣDSR(j)		2.900E-10	2.836E-10	2.714E-10	2.326E-10	1.500E-10	3.446E-11	4.769E-12	4.323E-12
0U-234	U-234	5.538E-14	3.827E-16	3.744E-16	3.581E-16	3.068E-16	1.970E-16	4.186E-17	5.007E-19	9.371E-26
U-234	Th-230	5.538E-14	9.195E-21	2.731E-20	6.237E-20	1.735E-19	4.107E-19	7.452E-19	8.301E-19	8.152E-19
U-234	Ra-226+D3	5.538E-14	2.997E-22	2.075E-21	1.070E-20	8.764E-20	5.771E-19	2.837E-18	4.864E-18	4.789E-18
U-234	Pb-210+D2	5.538E-14	2.552E-26	3.762E-25	4.224E-24	9.757E-23	1.624E-21	1.730E-20	3.911E-20	3.992E-20
U-234	ΣDSR(j)		3.827E-16	3.744E-16	3.582E-16	3.070E-16	1.980E-16	4.546E-17	6.234E-18	5.645E-18
0U-234	U-234	7.972E-16	5.509E-18	5.388E-18	5.155E-18	4.415E-18	2.836E-18	6.025E-19	7.207E-21	1.349E-27
U-234	Th-230	7.972E-16	1.323E-22	3.932E-22	8.978E-22	2.498E-21	5.911E-21	1.073E-20	1.195E-20	1.173E-20
U-234	Ra-226+D3	7.972E-16	4.314E-24	2.987E-23	1.540E-22	1.261E-21	8.307E-21	4.084E-20	7.001E-20	6.894E-20
U-234	Pb-210+D3	7.972E-16	1.176E-27	1.734E-26	1.946E-25	4.495E-24	7.484E-23	7.971E-22	1.801E-21	1.831E-21
U-234	ΣDSR(j)		5.509E-18	5.389E-18	5.156E-18	4.419E-18	2.851E-18	6.549E-19	9.097E-20	8.250E-20
0U-234	U-234	2.000E-07	1.382E-09	1.352E-09	1.293E-09	1.108E-09	7.116E-10	1.512E-10	1.808E-12	3.384E-19
U-234	Th-230	2.000E-07	3.320E-14	9.864E-14	2.252E-13	6.266E-13	1.483E-12	2.691E-12	2.998E-12	2.944E-12
U-234	Ra-226+D4	2.000E-07	6.185E-18	4.282E-17	2.208E-16	1.809E-15	1.192E-14	5.866E-14	1.010E-13	1.015E-13
U-234	Pb-210+D1	2.000E-07	2.353E-19	3.470E-18	3.895E-17	8.998E-16	1.498E-14	1.596E-13	3.606E-13	3.681E-13
U-234	ΣDSR(j)		1.382E-09	1.352E-09	1.294E-09	1.108E-09	7.131E-10	1.541E-10	5.267E-12	3.413E-12
0U-234	U-234	2.640E-13	1.824E-15	1.784E-15	1.707E-15	1.462E-15	9.392E-16	1.995E-16	2.387E-18	4.467E-25
U-234	Th-230	2.640E-13	4.383E-20	1.302E-19	2.973E-19	8.272E-19	1.958E-18	3.552E-18	3.957E-18	3.886E-18
U-234	Ra-226+D4	2.640E-13	8.164E-24	5.653E-23	2.915E-22	2.388E-21	1.573E-20	7.743E-20	1.333E-19	1.340E-19
U-234	Pb-210+D2	2.640E-13	1.216E-25	1.793E-24	2.013E-23	4.651E-22	7.743E-21	8.248E-20	1.864E-19	1.903E-19
U-234	ΣDSR(j)		1.824E-15	1.785E-15	1.707E-15	1.463E-15	9.412E-16	2.032E-16	6.663E-18	4.210E-18
0U-234	U-234	3.800E-15	2.626E-17	2.569E-17	2.457E-17	2.105E-17	1.352E-17	2.872E-18	3.435E-20	6.430E-27
U-234	Th-230	3.800E-15	6.309E-22	1.874E-21	4.279E-21	1.191E-20	2.818E-20	5.113E-20	5.696E-20	5.593E-20
U-234	Ra-226+D4	3.800E-15	1.175E-25	8.137E-25	4.196E-24	3.437E-23	2.264E-22	1.115E-21	1.919E-21	1.929E-21
U-234	Pb-210+D3	3.800E-15	5.604E-27	8.263E-26	9.277E-25	2.143E-23	3.567E-22	3.800E-21	8.583E-21	8.727E-21
U-234	ΣDSR(j)		2.626E-17	2.569E-17	2.458E-17	2.106E-17	1.355E-17	2.928E-18	1.018E-19	6.659E-20

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-235+D	U-235+D	9.835E-01	2.416E-01	2.363E-01	2.261E-01	1.936E-01	1.244E-01	2.643E-02	3.164E-04	5.930E-11
U-235+D	Pa-231	9.835E-01	1.370E-06	4.030E-06	9.003E-06	2.314E-05	4.318E-05	3.021E-05	1.079E-06	6.674E-13
U-235+D	Ac-227+D	9.835E-01	8.002E-08	5.397E-07	2.624E-06	1.750E-05	6.711E-05	7.051E-05	2.821E-06	1.807E-12
U-235+D	ΣDSR(j)		2.416E-01	2.363E-01	2.261E-01	1.937E-01	1.245E-01	2.653E-02	3.203E-04	6.178E-11
0U-235+D	U-235+D	2.722E-03	6.686E-04	6.540E-04	6.256E-04	5.359E-04	3.443E-04	7.315E-05	8.757E-07	1.641E-13
U-235+D	Pa-231	2.722E-03	3.792E-09	1.115E-08	2.492E-08	6.405E-08	1.195E-07	8.360E-08	2.985E-09	1.847E-15
U-235+D	Ac-227+D1	2.722E-03	2.236E-10	1.508E-09	7.333E-09	4.891E-08	1.876E-07	1.971E-07	7.882E-09	5.048E-15
U-235+D	ΣDSR(j)		6.686E-04	6.540E-04	6.257E-04	5.360E-04	3.446E-04	7.344E-05	8.866E-07	1.710E-13
0U-235+D	U-235+D	1.376E-02	3.380E-03	3.306E-03	3.163E-03	2.709E-03	1.740E-03	3.698E-04	4.427E-06	8.298E-13
U-235+D	Pa-231	1.376E-02	1.917E-08	5.640E-08	1.260E-07	3.238E-07	6.041E-07	4.227E-07	1.509E-08	9.339E-15
U-235+D	Ac-227+D2	1.376E-02	9.258E-10	6.244E-09	3.036E-08	2.025E-07	7.764E-07	8.158E-07	3.263E-08	2.089E-14
U-235+D	ΣDSR(j)		3.380E-03	3.306E-03	3.163E-03	2.710E-03	1.742E-03	3.711E-04	4.475E-06	8.600E-13
0U-235+D	U-235+D	3.809E-05	9.355E-06	9.150E-06	8.754E-06	7.498E-06	4.817E-06	1.024E-06	1.225E-08	2.297E-15
U-235+D	Pa-231	3.809E-05	5.306E-11	1.561E-10	3.487E-10	8.961E-10	1.672E-09	1.170E-09	4.177E-11	2.585E-17
U-235+D	Ac-227+D3	3.809E-05	2.593E-12	1.749E-11	8.501E-11	5.671E-10	2.174E-09	2.284E-09	9.137E-11	5.849E-17
U-235+D	ΣDSR(j)		9.355E-06	9.150E-06	8.755E-06	7.500E-06	4.821E-06	1.027E-06	1.239E-08	2.381E-15
0U-235+D	U-235+D	8.257E-07	2.028E-07	1.984E-07	1.898E-07	1.626E-07	1.044E-07	2.219E-08	2.657E-10	4.979E-17
U-235+D	Pa-231	8.257E-07	1.150E-12	3.384E-12	7.559E-12	1.943E-11	3.625E-11	2.536E-11	9.055E-13	5.604E-19
U-235+D	Ac-227+D4	8.257E-07	6.836E-14	4.610E-13	2.241E-12	1.495E-11	5.732E-11	6.021E-11	2.406E-12	1.534E-18
U-235+D	ΣDSR(j)		2.028E-07	1.984E-07	1.898E-07	1.626E-07	1.045E-07	2.228E-08	2.690E-10	5.189E-17
0U-235+D	U-235+D	2.285E-09	5.613E-10	5.491E-10	5.253E-10	4.499E-10	2.890E-10	6.142E-11	7.353E-13	1.378E-19
U-235+D	Pa-231	2.285E-09	3.184E-15	9.365E-15	2.092E-14	5.377E-14	1.003E-13	7.019E-14	2.506E-15	1.551E-21
U-235+D	Ac-227+D5	2.285E-09	1.910E-16	1.288E-15	6.263E-15	4.178E-14	1.602E-13	1.682E-13	6.723E-15	4.285E-21
U-235+D	ΣDSR(j)		5.613E-10	5.491E-10	5.253E-10	4.500E-10	2.893E-10	6.166E-11	7.445E-13	1.436E-19
0U-238	U-238	5.450E-07	3.342E-09	3.269E-09	3.128E-09	2.679E-09	1.721E-09	3.656E-10	4.376E-12	8.206E-19
0U-238+D	U-238+D	1.599E-03	4.280E-03	4.186E-03	4.005E-03	3.430E-03	2.203E-03	4.677E-04	5.583E-06	1.032E-12
U-238+D	U-234	1.599E-03	1.554E-11	4.573E-11	1.021E-10	2.626E-10	4.900E-10	3.430E-10	1.227E-11	7.655E-18
U-238+D	Th-230	1.599E-03	2.490E-16	1.721E-15	8.841E-15	7.145E-14	4.537E-13	2.006E-12	3.036E-12	3.008E-12
U-238+D	Ra-226+D	1.599E-03	2.472E-18	3.660E-17	4.148E-16	9.908E-15	1.803E-13	2.424E-12	6.969E-12	7.177E-12
U-238+D	Pb-210+D1	1.599E-03	1.062E-21	3.233E-20	7.835E-19	5.318E-17	2.531E-15	8.118E-14	3.461E-13	3.760E-13
U-238+D	ΣDSR(j)		4.280E-03	4.186E-03	4.005E-03	3.430E-03	2.203E-03	4.677E-04	5.583E-06	1.159E-11
0U-238+D	U-238+D	2.111E-09	5.649E-09	5.525E-09	5.286E-09	4.527E-09	2.908E-09	6.173E-10	7.370E-12	1.362E-18
U-238+D	U-234	2.111E-09	2.052E-17	6.036E-17	1.348E-16	3.466E-16	6.468E-16	4.528E-16	1.620E-17	1.010E-23
U-238+D	Th-230	2.111E-09	3.286E-22	2.272E-21	1.167E-20	9.432E-20	5.989E-19	2.648E-18	4.007E-18	3.970E-18
U-238+D	Ra-226+D	2.111E-09	3.262E-24	4.831E-23	5.475E-22	1.308E-20	2.380E-19	3.200E-18	9.199E-18	9.473E-18
U-238+D	Pb-210+D2	2.111E-09	5.488E-28	1.671E-26	4.050E-25	2.749E-23	1.308E-21	4.196E-20	1.789E-19	1.944E-19
U-238+D	ΣDSR(j)		5.649E-09	5.525E-09	5.286E-09	4.527E-09	2.908E-09	6.173E-10	7.370E-12	1.500E-17

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	3.039E-11	8.131E-11	7.953E-11	7.609E-11	6.517E-11	4.185E-11	8.886E-12	1.061E-13	1.961E-20
U-238+D	U-234	3.039E-11	2.954E-19	8.688E-19	1.941E-18	4.989E-18	9.310E-18	6.518E-18	2.332E-19	1.454E-25
U-238+D	Th-230	3.039E-11	4.730E-24	3.270E-23	1.680E-22	1.358E-21	8.620E-21	3.811E-20	5.768E-20	5.714E-20
U-238+D	Ra-226+D	3.039E-11	4.696E-26	6.954E-25	7.881E-24	1.883E-22	3.425E-21	4.606E-20	1.324E-19	1.364E-19
U-238+D	Pb-210+D3	3.039E-11	2.528E-29	7.700E-28	1.866E-26	1.266E-24	6.028E-23	1.933E-21	8.237E-21	8.916E-21
U-238+D	ΣDSR(j)		8.131E-11	7.953E-11	7.609E-11	6.517E-11	4.185E-11	8.886E-12	1.061E-13	2.220E-19
0U-238+D	U-238+D	3.359E-07	8.989E-07	8.792E-07	8.412E-07	7.204E-07	4.627E-07	9.824E-08	1.173E-09	2.167E-16
U-238+D	U-234	3.359E-07	3.265E-15	9.605E-15	2.146E-14	5.515E-14	1.029E-13	7.205E-14	2.578E-15	1.608E-21
U-238+D	Th-230	3.359E-07	5.229E-20	3.615E-19	1.857E-18	1.501E-17	9.530E-17	4.214E-16	6.377E-16	6.317E-16
U-238+D	Ra-226+D1	3.359E-07	1.344E-21	1.990E-20	2.256E-19	5.388E-18	9.804E-17	1.318E-15	3.789E-15	3.901E-15
U-238+D	Pb-210+D1	3.359E-07	2.230E-25	6.792E-24	1.646E-22	1.117E-20	5.317E-19	1.705E-17	7.269E-17	7.898E-17
U-238+D	ΣDSR(j)		8.989E-07	8.792E-07	8.412E-07	7.204E-07	4.627E-07	9.824E-08	1.173E-09	4.829E-15
0U-238+D	U-238+D	4.434E-13	1.187E-12	1.161E-12	1.110E-12	9.509E-13	6.108E-13	1.297E-13	1.548E-15	2.861E-22
U-238+D	U-234	4.434E-13	4.310E-21	1.268E-20	2.832E-20	7.280E-20	1.359E-19	9.511E-20	3.403E-21	2.122E-27
U-238+D	Th-230	4.434E-13	6.903E-26	4.771E-25	2.451E-24	1.981E-23	1.258E-22	5.562E-22	8.417E-22	8.339E-22
U-238+D	Ra-226+D1	4.434E-13	1.774E-27	2.627E-26	2.977E-25	7.112E-24	1.294E-22	1.740E-21	5.002E-21	5.149E-21
U-238+D	Pb-210+D2	4.434E-13	1.153E-31	3.510E-30	8.506E-29	5.773E-27	2.748E-25	8.814E-24	3.758E-23	4.083E-23
U-238+D	ΣDSR(j)		1.187E-12	1.161E-12	1.110E-12	9.509E-13	6.108E-13	1.297E-13	1.548E-15	6.310E-21
0U-238+D	U-238+D	6.383E-15	1.708E-14	1.671E-14	1.598E-14	1.369E-14	8.791E-15	1.866E-15	2.228E-17	4.118E-24
U-238+D	U-234	6.383E-15	6.204E-23	1.825E-22	4.077E-22	1.048E-21	1.955E-21	1.369E-21	4.898E-23	3.055E-29
U-238+D	Th-230	6.383E-15	9.936E-28	6.868E-27	3.528E-26	2.852E-25	1.811E-24	8.006E-24	1.212E-23	1.200E-23
U-238+D	Ra-226+D1	6.383E-15	2.554E-29	3.781E-28	4.286E-27	1.024E-25	1.863E-24	2.505E-23	7.200E-23	7.412E-23
U-238+D	Pb-210+D3	6.383E-15	5.311E-33	1.617E-31	3.919E-30	2.660E-28	1.266E-26	4.060E-25	1.730E-24	1.873E-24
U-238+D	ΣDSR(j)		1.708E-14	1.671E-14	1.598E-14	1.369E-14	8.791E-15	1.866E-15	2.228E-17	9.211E-23
0U-238+D	U-238+D	3.196E-07	8.552E-07	8.365E-07	8.003E-07	6.854E-07	4.402E-07	9.346E-08	1.116E-09	2.062E-16
U-238+D	U-234	3.196E-07	3.107E-15	9.138E-15	2.041E-14	5.247E-14	9.792E-14	6.855E-14	2.452E-15	1.530E-21
U-238+D	Th-230	3.196E-07	4.975E-20	3.439E-19	1.767E-18	1.428E-17	9.067E-17	4.009E-16	6.067E-16	6.010E-16
U-238+D	Ra-226+D2	3.196E-07	4.330E-22	6.411E-21	7.266E-20	1.736E-18	3.158E-17	4.246E-16	1.220E-15	1.254E-15
U-238+D	Pb-210+D1	3.196E-07	2.122E-25	6.462E-24	1.566E-22	1.063E-20	5.059E-19	1.622E-17	6.916E-17	7.514E-17
U-238+D	ΣDSR(j)		8.552E-07	8.365E-07	8.003E-07	6.854E-07	4.402E-07	9.346E-08	1.116E-09	2.136E-15
0U-238+D	U-238+D	4.219E-13	1.129E-12	1.104E-12	1.056E-12	9.047E-13	5.811E-13	1.234E-13	1.473E-15	2.722E-22
U-238+D	U-234	4.219E-13	4.101E-21	1.206E-20	2.695E-20	6.926E-20	1.293E-19	9.049E-20	3.237E-21	2.019E-27
U-238+D	Th-230	4.219E-13	6.567E-26	4.540E-25	2.332E-24	1.885E-23	1.197E-22	5.292E-22	8.008E-22	7.934E-22
U-238+D	Ra-226+D2	4.219E-13	5.715E-28	8.463E-27	9.591E-26	2.291E-24	4.168E-23	5.604E-22	1.610E-21	1.655E-21
U-238+D	Pb-210+D2	4.219E-13	1.097E-31	3.340E-30	8.093E-29	5.493E-27	2.615E-25	8.386E-24	3.575E-23	3.885E-23
U-238+D	ΣDSR(j)		1.129E-12	1.104E-12	1.056E-12	9.047E-13	5.811E-13	1.234E-13	1.473E-15	2.759E-21

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.073E-15	1.625E-14	1.589E-14	1.521E-14	1.302E-14	8.364E-15	1.776E-15	2.120E-17	3.918E-24
U-238+D	U-234	6.073E-15	5.902E-23	1.736E-22	3.879E-22	9.969E-22	1.860E-21	1.302E-21	4.660E-23	2.907E-29
U-238+D	Th-230	6.073E-15	9.453E-28	6.534E-27	3.357E-26	2.713E-25	1.723E-24	7.617E-24	1.153E-23	1.142E-23
U-238+D	Ra-226+D2	6.073E-15	8.226E-30	1.218E-28	1.381E-27	3.298E-26	6.000E-25	8.067E-24	2.318E-23	2.382E-23
U-238+D	Pb-210+D3	6.073E-15	5.053E-33	1.539E-31	3.729E-30	2.531E-28	1.205E-26	3.863E-25	1.646E-24	1.782E-24
U-238+D	ΣDSR(j)		1.625E-14	1.589E-14	1.521E-14	1.302E-14	8.364E-15	1.776E-15	2.120E-17	4.094E-23
0U-238+D	U-238+D	6.713E-11	1.796E-10	1.757E-10	1.681E-10	1.440E-10	9.246E-11	1.963E-11	2.344E-13	4.331E-20
U-238+D	U-234	6.713E-11	6.525E-19	1.919E-18	4.288E-18	1.102E-17	2.057E-17	1.440E-17	5.151E-19	3.213E-25
U-238+D	Th-230	6.713E-11	1.045E-23	7.223E-23	3.711E-22	2.999E-21	1.904E-20	8.420E-20	1.274E-19	1.262E-19
U-238+D	Ra-226+D3	6.713E-11	2.558E-25	3.788E-24	4.293E-23	1.025E-21	1.866E-20	2.509E-19	7.210E-19	7.417E-19
U-238+D	Pb-210+D1	6.713E-11	4.457E-29	1.357E-27	3.289E-26	2.232E-24	1.063E-22	3.408E-21	1.453E-20	1.578E-20
U-238+D	ΣDSR(j)		1.796E-10	1.757E-10	1.681E-10	1.440E-10	9.246E-11	1.963E-11	2.344E-13	9.270E-19
0U-238+D	U-238+D	8.862E-17	2.371E-16	2.319E-16	2.219E-16	1.900E-16	1.221E-16	2.591E-17	3.093E-19	5.717E-26
U-238+D	U-234	8.862E-17	8.613E-25	2.534E-24	5.660E-24	1.455E-23	2.715E-23	1.901E-23	6.800E-25	4.242E-31
U-238+D	Th-230	8.862E-17	1.379E-29	9.535E-29	4.898E-28	3.959E-27	2.514E-26	1.111E-25	1.682E-25	1.666E-25
U-238+D	Ra-226+D3	8.862E-17	3.377E-31	5.000E-30	5.667E-29	1.354E-27	2.463E-26	3.311E-25	9.517E-25	9.790E-25
U-238+D	Pb-210+D2	8.862E-17	2.303E-35	7.015E-34	1.700E-32	1.154E-30	5.492E-29	1.761E-27	7.509E-27	8.159E-27
U-238+D	ΣDSR(j)		2.371E-16	2.319E-16	2.219E-16	1.900E-16	1.221E-16	2.591E-17	3.093E-19	1.211E-24
0U-238+D	U-238+D	1.276E-18	3.413E-18	3.338E-18	3.194E-18	2.735E-18	1.757E-18	3.730E-19	4.453E-21	8.230E-28
U-238+D	U-234	1.276E-18	1.240E-26	3.647E-26	8.147E-26	2.094E-25	3.908E-25	2.736E-25	9.787E-27	6.105E-33
U-238+D	Th-230	1.276E-18	1.986E-31	1.372E-30	7.051E-30	5.698E-29	3.618E-28	1.600E-27	2.421E-27	2.399E-27
U-238+D	Ra-226+D3	1.276E-18	4.860E-33	7.197E-32	8.156E-31	1.948E-29	3.545E-28	4.766E-27	1.370E-26	1.409E-26
U-238+D	Pb-210+D3	1.276E-18	1.061E-36	3.232E-35	7.832E-34	5.316E-32	2.530E-30	8.114E-29	3.458E-28	3.742E-28
U-238+D	ΣDSR(j)		3.413E-18	3.338E-18	3.194E-18	2.735E-18	1.757E-18	3.730E-19	4.453E-21	1.769E-26
0U-238+D	U-238+D	3.200E-10	8.563E-10	8.375E-10	8.013E-10	6.862E-10	4.407E-10	9.358E-11	1.117E-12	2.065E-19
U-238+D	U-234	3.200E-10	3.110E-18	9.149E-18	2.044E-17	5.253E-17	9.804E-17	6.863E-17	2.455E-18	1.532E-24
U-238+D	Th-230	3.200E-10	4.981E-23	3.443E-22	1.769E-21	1.430E-20	9.078E-20	4.014E-19	6.074E-19	6.018E-19
U-238+D	Ra-226+D4	3.200E-10	6.968E-27	1.032E-25	1.169E-24	2.794E-23	5.085E-22	6.846E-21	1.976E-20	2.075E-20
U-238+D	Pb-210+D1	3.200E-10	2.124E-28	6.470E-27	1.568E-25	1.064E-23	5.065E-22	1.624E-20	6.925E-20	7.524E-20
U-238+D	ΣDSR(j)		8.563E-10	8.375E-10	8.013E-10	6.862E-10	4.407E-10	9.358E-11	1.117E-12	9.042E-19
0U-238+D	U-238+D	4.224E-16	1.130E-15	1.106E-15	1.058E-15	9.058E-16	5.818E-16	1.235E-16	1.475E-18	2.725E-25
U-238+D	U-234	4.224E-16	4.106E-24	1.208E-23	2.698E-23	6.934E-23	1.294E-22	9.060E-23	3.241E-24	2.022E-30
U-238+D	Th-230	4.224E-16	6.575E-29	4.545E-28	2.335E-27	1.887E-26	1.198E-25	5.298E-25	8.018E-25	7.943E-25
U-238+D	Ra-226+D4	4.224E-16	9.198E-33	1.362E-31	1.544E-30	3.688E-29	6.712E-28	9.037E-27	2.608E-26	2.739E-26
U-238+D	Pb-210+D2	4.224E-16	1.098E-34	3.344E-33	8.102E-32	5.499E-30	2.618E-28	8.396E-27	3.579E-26	3.889E-26
U-238+D	ΣDSR(j)		1.130E-15	1.106E-15	1.058E-15	9.058E-16	5.818E-16	1.235E-16	1.475E-18	1.133E-24

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.080E-18	1.627E-17	1.591E-17	1.522E-17	1.304E-17	8.374E-18	1.778E-18	2.122E-20	3.923E-27
U-238+D	U-234	6.080E-18	5.910E-26	1.738E-25	3.883E-25	9.981E-25	1.863E-24	1.304E-24	4.665E-26	2.910E-32
U-238+D	Th-230	6.080E-18	9.465E-31	6.542E-30	3.361E-29	2.716E-28	1.725E-27	7.626E-27	1.154E-26	1.143E-26
U-238+D	Ra-226+D4	6.080E-18	1.324E-34	1.960E-33	2.222E-32	5.308E-31	9.662E-30	1.301E-28	3.754E-28	3.943E-28
U-238+D	Pb-210+D3	6.080E-18	5.059E-36	1.541E-34	3.733E-33	2.534E-31	1.206E-29	3.868E-28	1.648E-27	1.784E-27
U-238+D	ΣDSR(j)		1.627E-17	1.591E-17	1.522E-17	1.304E-17	8.374E-18	1.778E-18	2.122E-20	1.753E-26
0U-238+D1	U-238+D1	9.980E-01	5.389E-02	5.271E-02	5.043E-02	4.319E-02	2.774E-02	5.891E-03	7.038E-05	1.307E-11
U-238+D1	U-234	9.980E-01	9.700E-09	2.853E-08	6.374E-08	1.638E-07	3.058E-07	2.141E-07	7.658E-09	4.777E-15
U-238+D1	Th-230	9.980E-01	1.554E-13	1.074E-12	5.516E-12	4.459E-11	2.831E-10	1.252E-09	1.894E-09	1.877E-09
U-238+D1	Ra-226+D	9.980E-01	1.542E-15	2.284E-14	2.588E-13	6.183E-12	1.125E-10	1.513E-09	4.348E-09	4.478E-09
U-238+D1	Pb-210+D1	9.980E-01	6.625E-19	2.018E-17	4.889E-16	3.318E-14	1.580E-12	5.066E-11	2.160E-10	2.346E-10
U-238+D1	ΣDSR(j)		5.389E-02	5.271E-02	5.043E-02	4.319E-02	2.774E-02	5.891E-03	7.040E-05	6.603E-09
0U-238+D1	U-238+D1	1.317E-06	7.114E-08	6.958E-08	6.657E-08	5.701E-08	3.662E-08	7.776E-09	9.291E-11	1.725E-17
U-238+D1	U-234	1.317E-06	1.280E-14	3.766E-14	8.414E-14	2.163E-13	4.036E-13	2.825E-13	1.011E-14	6.305E-21
U-238+D1	Th-230	1.317E-06	2.051E-19	1.417E-18	7.282E-18	5.885E-17	3.737E-16	1.652E-15	2.501E-15	2.477E-15
U-238+D1	Ra-226+D	1.317E-06	2.036E-21	3.014E-20	3.417E-19	8.161E-18	1.485E-16	1.997E-15	5.740E-15	5.911E-15
U-238+D1	Pb-210+D2	1.317E-06	3.424E-25	1.043E-23	2.527E-22	1.715E-20	8.165E-19	2.618E-17	1.116E-16	1.213E-16
U-238+D1	ΣDSR(j)		7.114E-08	6.958E-08	6.657E-08	5.701E-08	3.662E-08	7.777E-09	9.292E-11	8.527E-15
0U-238+D1	U-238+D1	1.896E-08	1.024E-09	1.002E-09	9.581E-10	8.206E-10	5.271E-10	1.119E-10	1.337E-12	2.483E-19
U-238+D1	U-234	1.896E-08	1.843E-16	5.421E-16	1.211E-15	3.113E-15	5.809E-15	4.067E-15	1.455E-16	9.076E-23
U-238+D1	Th-230	1.896E-08	2.952E-21	2.040E-20	1.048E-19	8.471E-19	5.379E-18	2.378E-17	3.599E-17	3.566E-17
U-238+D1	Ra-226+D	1.896E-08	2.930E-23	4.339E-22	4.918E-21	1.175E-19	2.137E-18	2.874E-17	8.262E-17	8.509E-17
U-238+D1	Pb-210+D3	1.896E-08	1.578E-26	4.805E-25	1.164E-23	7.902E-22	3.762E-20	1.206E-18	5.140E-18	5.563E-18
U-238+D1	ΣDSR(j)		1.024E-09	1.002E-09	9.581E-10	8.206E-10	5.271E-10	1.119E-10	1.338E-12	1.266E-16
0U-238+D1	U-238+D1	2.096E-04	1.132E-05	1.107E-05	1.059E-05	9.072E-06	5.827E-06	1.237E-06	1.478E-08	2.745E-15
U-238+D1	U-234	2.096E-04	2.037E-12	5.993E-12	1.339E-11	3.441E-11	6.422E-11	4.496E-11	1.608E-12	1.003E-18
U-238+D1	Th-230	2.096E-04	3.263E-17	2.256E-16	1.159E-15	9.365E-15	5.947E-14	2.629E-13	3.979E-13	3.942E-13
U-238+D1	Ra-226+D1	2.096E-04	8.387E-19	1.242E-17	1.408E-16	3.362E-15	6.118E-14	8.226E-13	2.365E-12	2.434E-12
U-238+D1	Pb-210+D1	2.096E-04	1.392E-22	4.238E-21	1.027E-19	6.970E-18	3.318E-16	1.064E-14	4.536E-14	4.928E-14
U-238+D1	ΣDSR(j)		1.132E-05	1.107E-05	1.059E-05	9.072E-06	5.827E-06	1.237E-06	1.479E-08	2.880E-12
0U-238+D1	U-238+D1	2.767E-10	1.494E-11	1.461E-11	1.398E-11	1.197E-11	7.691E-12	1.633E-12	1.951E-14	3.623E-21
U-238+D1	U-234	2.767E-10	2.689E-18	7.911E-18	1.767E-17	4.543E-17	8.477E-17	5.935E-17	2.123E-18	1.324E-24
U-238+D1	Th-230	2.767E-10	4.307E-23	2.977E-22	1.529E-21	1.236E-20	7.850E-20	3.471E-19	5.252E-19	5.203E-19
U-238+D1	Ra-226+D1	2.767E-10	1.107E-24	1.639E-23	1.858E-22	4.438E-21	8.075E-20	1.086E-18	3.121E-18	3.213E-18
U-238+D1	Pb-210+D2	2.767E-10	7.193E-29	2.190E-27	5.308E-26	3.603E-24	1.715E-22	5.500E-21	2.345E-20	2.548E-20
U-238+D1	ΣDSR(j)		1.494E-11	1.461E-11	1.398E-11	1.197E-11	7.692E-12	1.633E-12	1.952E-14	3.763E-18

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 34
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	3.983E-12	2.151E-13	2.104E-13	2.013E-13	1.724E-13	1.107E-13	2.351E-14	2.809E-16	5.216E-23
U-238+D1	U-234	3.983E-12	3.871E-20	1.139E-19	2.544E-19	6.539E-19	1.220E-18	8.542E-19	3.056E-20	1.906E-26
U-238+D1	Th-230	3.983E-12	6.200E-25	4.286E-24	2.202E-23	1.779E-22	1.130E-21	4.996E-21	7.560E-21	7.490E-21
U-238+D1	Ra-226+D1	3.983E-12	1.594E-26	2.360E-25	2.674E-24	6.388E-23	1.162E-21	1.563E-20	4.493E-20	4.625E-20
U-238+D1	Pb-210+D3	3.983E-12	3.314E-30	1.009E-28	2.445E-27	1.660E-25	7.901E-24	2.534E-22	1.080E-21	1.169E-21
U-238+D1	ΣDSR(j)		2.151E-13	2.104E-13	2.013E-13	1.724E-13	1.107E-13	2.351E-14	2.810E-16	5.496E-20
0U-238+D1	U-238+D1	1.994E-04	1.077E-05	1.053E-05	1.008E-05	8.631E-06	5.544E-06	1.177E-06	1.407E-08	2.612E-15
U-238+D1	U-234	1.994E-04	1.938E-12	5.702E-12	1.274E-11	3.274E-11	6.110E-11	4.278E-11	1.530E-12	9.546E-19
U-238+D1	Th-230	1.994E-04	3.105E-17	2.146E-16	1.102E-15	8.910E-15	5.658E-14	2.502E-13	3.786E-13	3.750E-13
U-238+D1	Ra-226+D2	1.994E-04	2.702E-19	4.001E-18	4.534E-17	1.083E-15	1.971E-14	2.649E-13	7.612E-13	7.823E-13
U-238+D1	Pb-210+D1	1.994E-04	1.324E-22	4.032E-21	9.770E-20	6.631E-18	3.157E-16	1.012E-14	4.316E-14	4.689E-14
U-238+D1	ΣDSR(j)		1.077E-05	1.053E-05	1.008E-05	8.631E-06	5.544E-06	1.177E-06	1.407E-08	1.207E-12
0U-238+D1	U-238+D1	2.633E-10	1.422E-11	1.390E-11	1.330E-11	1.139E-11	7.318E-12	1.554E-12	1.857E-14	3.447E-21
U-238+D1	U-234	2.633E-10	2.559E-18	7.527E-18	1.681E-17	4.322E-17	8.065E-17	5.646E-17	2.020E-18	1.260E-24
U-238+D1	Th-230	2.633E-10	4.098E-23	2.833E-22	1.455E-21	1.176E-20	7.468E-20	3.302E-19	4.997E-19	4.951E-19
U-238+D1	Ra-226+D2	2.633E-10	3.566E-25	5.281E-24	5.985E-23	1.430E-21	2.601E-20	3.497E-19	1.005E-18	1.033E-18
U-238+D1	Pb-210+D2	2.633E-10	6.843E-29	2.084E-27	5.050E-26	3.427E-24	1.632E-22	5.233E-21	2.231E-20	2.424E-20
U-238+D1	ΣDSR(j)		1.422E-11	1.390E-11	1.330E-11	1.139E-11	7.318E-12	1.554E-12	1.857E-14	1.555E-18
0U-238+D1	U-238+D1	3.789E-12	2.046E-13	2.001E-13	1.915E-13	1.640E-13	1.053E-13	2.237E-14	2.672E-16	4.962E-23
U-238+D1	U-234	3.789E-12	3.683E-20	1.083E-19	2.420E-19	6.221E-19	1.161E-18	8.127E-19	2.908E-20	1.814E-26
U-238+D1	Th-230	3.789E-12	5.899E-25	4.077E-24	2.095E-23	1.693E-22	1.075E-21	4.753E-21	7.193E-21	7.126E-21
U-238+D1	Ra-226+D2	3.789E-12	5.133E-27	7.601E-26	8.615E-25	2.058E-23	3.744E-22	5.034E-21	1.446E-20	1.486E-20
U-238+D1	Pb-210+D3	3.789E-12	3.153E-30	9.602E-29	2.327E-27	1.579E-25	7.517E-24	2.411E-22	1.027E-21	1.112E-21
U-238+D1	ΣDSR(j)		2.046E-13	2.001E-13	1.915E-13	1.640E-13	1.053E-13	2.237E-14	2.673E-16	2.315E-20
0U-238+D1	U-238+D1	4.189E-08	2.262E-09	2.213E-09	2.117E-09	1.813E-09	1.164E-09	2.473E-10	2.954E-12	5.486E-19
U-238+D1	U-234	4.189E-08	4.072E-16	1.198E-15	2.676E-15	6.877E-15	1.283E-14	8.985E-15	3.214E-16	2.005E-22
U-238+D1	Th-230	4.189E-08	6.521E-21	4.507E-20	2.316E-19	1.872E-18	1.188E-17	5.254E-17	7.952E-17	7.878E-17
U-238+D1	Ra-226+D3	4.189E-08	1.596E-22	2.364E-21	2.679E-20	6.399E-19	1.164E-17	1.565E-16	4.499E-16	4.628E-16
U-238+D1	Pb-210+D1	4.189E-08	2.781E-26	8.469E-25	2.052E-23	1.393E-21	6.631E-20	2.126E-18	9.065E-18	9.849E-18
U-238+D1	ΣDSR(j)		2.262E-09	2.213E-09	2.117E-09	1.813E-09	1.164E-09	2.473E-10	2.955E-12	5.520E-16
0U-238+D1	U-238+D1	5.530E-14	2.986E-15	2.921E-15	2.794E-15	2.393E-15	1.537E-15	3.264E-16	3.900E-18	7.241E-25
U-238+D1	U-234	5.530E-14	5.375E-22	1.581E-21	3.532E-21	9.078E-21	1.694E-20	1.186E-20	4.243E-22	2.647E-28
U-238+D1	Th-230	5.530E-14	8.608E-27	5.950E-26	3.057E-25	2.470E-24	1.569E-23	6.936E-23	1.050E-22	1.040E-22
U-238+D1	Ra-226+D3	5.530E-14	2.107E-28	3.120E-27	3.536E-26	8.446E-25	1.537E-23	2.066E-22	5.939E-22	6.109E-22
U-238+D1	Pb-210+D2	5.530E-14	1.437E-32	4.377E-31	1.061E-29	7.199E-28	3.427E-26	1.099E-24	4.686E-24	5.092E-24
U-238+D1	ΣDSR(j)		2.986E-15	2.921E-15	2.794E-15	2.393E-15	1.537E-15	3.264E-16	3.901E-18	7.207E-22

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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	7.959E-16	4.298E-17	4.204E-17	4.022E-17	3.445E-17	2.212E-17	4.698E-18	5.613E-20	1.042E-26
U-238+D1	U-234	7.959E-16	7.736E-24	2.276E-23	5.084E-23	1.307E-22	2.438E-22	1.707E-22	6.107E-24	3.810E-30
U-238+D1	Th-230	7.959E-16	1.239E-28	8.564E-28	4.400E-27	3.556E-26	2.258E-25	9.983E-25	1.511E-24	1.497E-24
U-238+D1	Ra-226+D3	7.959E-16	3.033E-30	4.491E-29	5.090E-28	1.216E-26	2.212E-25	2.974E-24	8.548E-24	8.793E-24
U-238+D1	Pb-210+D3	7.959E-16	6.623E-34	2.017E-32	4.887E-31	3.317E-29	1.579E-27	5.063E-26	2.158E-25	2.335E-25
U-238+D1	ΣDSR(j)		4.298E-17	4.204E-17	4.022E-17	3.445E-17	2.212E-17	4.699E-18	5.615E-20	1.053E-23
0U-238+D1	U-238+D1	1.997E-07	1.078E-08	1.055E-08	1.009E-08	8.642E-09	5.551E-09	1.179E-09	1.408E-11	2.615E-18
U-238+D1	U-234	1.997E-07	1.941E-15	5.709E-15	1.275E-14	3.278E-14	6.118E-14	4.283E-14	1.532E-15	9.558E-22
U-238+D1	Th-230	1.997E-07	3.108E-20	2.149E-19	1.104E-18	8.921E-18	5.665E-17	2.505E-16	3.790E-16	3.755E-16
U-238+D1	Ra-226+D4	1.997E-07	4.348E-24	6.438E-23	7.297E-22	1.743E-20	3.173E-19	4.272E-18	1.233E-17	1.295E-17
U-238+D1	Pb-210+D1	1.997E-07	1.326E-25	4.037E-24	9.782E-23	6.639E-21	3.161E-19	1.014E-17	4.321E-17	4.695E-17
U-238+D1	ΣDSR(j)		1.078E-08	1.055E-08	1.009E-08	8.642E-09	5.551E-09	1.179E-09	1.408E-11	4.380E-16
0U-238+D1	U-238+D1	2.636E-13	1.423E-14	1.392E-14	1.332E-14	1.141E-14	7.327E-15	1.556E-15	1.859E-17	3.452E-24
U-238+D1	U-234	2.636E-13	2.562E-21	7.536E-21	1.683E-20	4.327E-20	8.075E-20	5.653E-20	2.023E-21	1.262E-27
U-238+D1	Th-230	2.636E-13	4.103E-26	2.836E-25	1.457E-24	1.178E-23	7.477E-23	3.306E-22	5.003E-22	4.957E-22
U-238+D1	Ra-226+D4	2.636E-13	5.739E-30	8.499E-29	9.632E-28	2.301E-26	4.188E-25	5.639E-24	1.627E-23	1.709E-23
U-238+D1	Pb-210+D2	2.636E-13	6.851E-32	2.087E-30	5.056E-29	3.432E-27	1.634E-25	5.239E-24	2.234E-23	2.427E-23
U-238+D1	ΣDSR(j)		1.423E-14	1.392E-14	1.332E-14	1.141E-14	7.327E-15	1.556E-15	1.859E-17	5.405E-22
0U-238+D1	U-238+D1	3.794E-15	2.049E-16	2.004E-16	1.917E-16	1.642E-16	1.055E-16	2.240E-17	2.676E-19	4.968E-26
U-238+D1	U-234	3.794E-15	3.688E-23	1.085E-22	2.423E-22	6.228E-22	1.162E-21	8.137E-22	2.911E-23	1.816E-29
U-238+D1	Th-230	3.794E-15	5.906E-28	4.082E-27	2.097E-26	1.695E-25	1.076E-24	4.759E-24	7.202E-24	7.135E-24
U-238+D1	Ra-226+D4	3.794E-15	8.261E-32	1.223E-30	1.386E-29	3.312E-28	6.029E-27	8.117E-26	2.343E-25	2.460E-25
U-238+D1	Pb-210+D3	3.794E-15	3.157E-33	9.614E-32	2.330E-30	1.581E-28	7.526E-27	2.413E-25	1.028E-24	1.113E-24
U-238+D1	ΣDSR(j)		2.049E-16	2.004E-16	1.917E-16	1.642E-16	1.055E-16	2.240E-17	2.676E-19	8.543E-24

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

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Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

0Nuclide

(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	3.494E+01	3.811E+01	4.533E+01	8.324E+01	4.724E+02	2.057E+05	7.131E+12	*7.232E+13
Pa-231	1.740E+02	1.542E+02	1.298E+02	1.002E+02	1.091E+02	4.623E+02	3.876E+04	*4.723E+10
Pb-210	1.107E+02	1.154E+02	1.256E+02	1.689E+02	3.938E+02	7.612E+03	3.602E+07	*7.632E+13
Ra-226	7.541E+00	7.649E+00	7.870E+00	8.710E+00	1.177E+01	3.569E+01	9.201E+02	8.212E+07
Ra-228	1.238E+01	1.025E+01	9.626E+00	1.792E+01	2.557E+02	3.579E+06	*2.726E+14	*2.726E+14
Th-228	1.044E+01	1.501E+01	3.100E+01	3.924E+02	5.542E+05	*8.201E+14	*8.201E+14	*8.201E+14
Th-230	6.740E+02	6.490E+02	6.052E+02	4.954E+02	3.476E+02	2.257E+02	1.957E+02	2.012E+02
Th-232	1.614E+02	5.857E+01	2.387E+01	9.040E+00	6.304E+00	6.186E+00	6.237E+00	6.461E+00
U-234	3.618E+03	3.698E+03	3.865E+03	4.511E+03	7.004E+03	3.161E+04	4.067E+05	4.836E+05
U-235	1.018E+02	1.041E+02	1.088E+02	1.270E+02	1.975E+02	9.267E+02	7.676E+04	*2.160E+06
U-238	4.296E+02	4.392E+02	4.591E+02	5.360E+02	8.345E+02	3.930E+03	3.289E+05	*3.361E+05

*At specific activity limit

0

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 325.4 ± 0.7 years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	7.000E-03	0.000E+00	7.155E-01	3.494E+01	3.866E-13	6.467E+13
Pa-231	1.400E-02	15.83 ± 0.03	2.601E-01	9.611E+01	3.674E-04	6.804E+04
Pb-210	8.000E-03	0.000E+00	0.000E+00	*7.632E+13	2.370E-07	1.055E+08
Pb-210	8.000E-03	0.000E+00	2.259E-01	1.107E+02	2.370E-07	1.055E+08
Ra-226	7.000E-03	0.000E+00	3.315E+00	7.541E+00	1.797E-02	1.391E+03
Ra-228	3.600E-04	2.451 ± 0.005	2.615E+00	9.561E+00	3.107E-19	*2.726E+14
Th-228	1.000E-03	0.000E+00	2.394E+00	1.044E+01	0.000E+00	*8.201E+14
Th-230	1.000E+00	346.3 ± 0.7	1.279E-01	1.955E+02	1.278E-01	1.956E+02
Th-232	1.000E-03	61.7 ± 0.1	4.046E+00	6.179E+00	4.004E+00	6.244E+00
U-234	1.200E-02	0.000E+00	6.911E-03	3.618E+03	5.786E-05	4.321E+05
U-235	5.200E-04	0.000E+00	2.456E-01	1.018E+02	1.859E-04	1.345E+05
U-238	1.200E-02	0.000E+00	5.819E-02	4.296E+02	4.332E-05	*3.361E+05

*At specific activity limit

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	4.937E-03	4.527E-03	3.805E-03	2.073E-03	3.652E-04	8.387E-07	2.419E-14	0.000E+00
Ac-227	Ac-227	2.722E-03	1.380E-05	1.265E-05	1.064E-05	5.792E-06	1.021E-06	2.344E-09	6.761E-17	0.000E+00
Ac-227	Pa-231	9.835E-01	1.583E-04	4.526E-04	9.503E-04	1.982E-03	2.224E-03	5.472E-04	6.528E-06	1.201E-12
Ac-227	U-235	9.835E-01	4.161E-11	2.806E-10	1.364E-09	9.101E-09	3.490E-08	3.667E-08	1.467E-09	9.394E-16
Ac-227	ΣDOSE(j)		5.110E-03	4.992E-03	4.766E-03	4.060E-03	2.590E-03	5.481E-04	6.529E-06	1.202E-12
0Ac-227	Ac-227	1.376E-02	5.713E-05	5.238E-05	4.403E-05	2.398E-05	4.225E-06	9.703E-09	2.799E-16	0.000E+00
Ac-227	Ac-227	3.809E-05	1.600E-07	1.467E-07	1.233E-07	6.715E-08	1.183E-08	2.717E-11	7.837E-19	0.000E+00
Ac-227	Pa-231	1.376E-02	1.831E-06	5.236E-06	1.100E-05	2.293E-05	2.573E-05	6.331E-06	7.552E-08	1.389E-14
Ac-227	U-235	1.376E-02	4.814E-13	3.247E-12	1.579E-11	1.053E-10	4.038E-10	4.242E-10	1.697E-11	1.086E-17
Ac-227	ΣDOSE(j)		5.912E-05	5.776E-05	5.515E-05	4.698E-05	2.997E-05	6.341E-06	7.554E-08	1.390E-14
0Ac-227	Ac-227	8.257E-07	4.218E-09	3.867E-09	3.251E-09	1.770E-09	3.119E-10	7.161E-13	2.064E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.179E-11	1.081E-11	9.084E-12	4.947E-12	8.716E-13	2.001E-15	5.766E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	1.352E-10	3.866E-10	8.118E-10	1.693E-09	1.899E-09	4.672E-10	5.569E-12	1.020E-18
Ac-227	U-235	8.257E-07	3.554E-17	2.397E-16	1.165E-15	7.774E-15	2.981E-14	3.131E-14	1.251E-15	7.975E-22
Ac-227	ΣDOSE(j)		4.365E-09	4.265E-09	4.072E-09	3.468E-09	2.212E-09	4.680E-10	5.570E-12	1.020E-18
0Pa-231	Pa-231	9.835E-01	1.820E-03	1.780E-03	1.703E-03	1.458E-03	9.364E-04	1.987E-04	2.367E-06	4.368E-13
Pa-231	Pa-231	2.722E-03	5.037E-06	4.927E-06	4.713E-06	4.036E-06	2.592E-06	5.499E-07	6.552E-09	1.209E-15
Pa-231	U-235	9.835E-01	7.125E-10	2.096E-09	4.682E-09	1.203E-08	2.245E-08	1.571E-08	5.609E-10	3.471E-16
Pa-231	U-235	2.722E-03	1.972E-12	5.801E-12	1.296E-11	3.330E-11	6.214E-11	4.347E-11	1.552E-12	9.606E-19
Pa-231	U-235	1.376E-02	9.969E-12	2.933E-11	6.551E-11	1.684E-10	3.142E-10	2.198E-10	7.848E-12	4.856E-18
Pa-231	U-235	3.809E-05	2.759E-14	8.116E-14	1.813E-13	4.660E-13	8.695E-13	6.083E-13	2.172E-14	1.344E-20
Pa-231	U-235	8.257E-07	5.982E-16	1.760E-15	3.931E-15	1.010E-14	1.885E-14	1.319E-14	4.709E-16	2.914E-22
Pa-231	U-235	2.285E-09	1.656E-18	4.870E-18	1.088E-17	2.796E-17	5.217E-17	3.650E-17	1.303E-18	8.065E-25
Pa-231	ΣDOSE(j)		1.825E-03	1.785E-03	1.708E-03	1.462E-03	9.391E-04	1.992E-04	2.375E-06	4.383E-13
0Ac-227	Pa-231	2.722E-03	4.424E-07	1.265E-06	2.656E-06	5.540E-06	6.215E-06	1.529E-06	1.824E-08	3.356E-15
Ac-227	U-235	2.722E-03	1.163E-13	7.843E-13	3.813E-12	2.544E-11	9.753E-11	1.025E-10	4.099E-12	2.625E-18
Ac-227	ΣDOSE(j)		4.424E-07	1.265E-06	2.656E-06	5.540E-06	6.215E-06	1.529E-06	1.825E-08	3.358E-15
0Pa-231	Pa-231	1.376E-02	2.547E-05	2.491E-05	2.383E-05	2.041E-05	1.310E-05	2.780E-06	3.313E-08	6.111E-15
Pa-231	Pa-231	3.809E-05	7.048E-08	6.893E-08	6.595E-08	5.648E-08	3.626E-08	7.694E-09	9.168E-11	1.691E-17
Pa-231	ΣDOSE(j)		2.554E-05	2.498E-05	2.389E-05	2.046E-05	1.314E-05	2.788E-06	3.322E-08	6.128E-15
0Ac-227	Pa-231	3.809E-05	5.129E-09	1.466E-08	3.079E-08	6.422E-08	7.205E-08	1.773E-08	2.115E-10	3.888E-17
Ac-227	U-235	3.809E-05	1.348E-15	9.093E-15	4.421E-14	2.949E-13	1.131E-12	1.188E-12	4.751E-14	3.041E-20
Ac-227	ΣDOSE(j)		5.129E-09	1.466E-08	3.079E-08	6.422E-08	7.205E-08	1.773E-08	2.115E-10	3.891E-17
0Pa-231	Pa-231	8.257E-07	1.528E-09	1.495E-09	1.430E-09	1.224E-09	7.862E-10	1.668E-10	1.988E-12	3.667E-19
Pa-231	Pa-231	2.285E-09	4.229E-12	4.136E-12	3.957E-12	3.389E-12	2.176E-12	4.616E-13	5.501E-15	1.015E-21
Pa-231	ΣDOSE(j)		1.532E-09	1.499E-09	1.434E-09	1.228E-09	7.884E-10	1.673E-10	1.993E-12	3.677E-19
0Ac-227	Pa-231	2.285E-09	3.778E-13	1.080E-12	2.268E-12	4.731E-12	5.307E-12	1.306E-12	1.556E-14	2.848E-21
Ac-227	U-235	2.285E-09	9.932E-20	6.699E-19	3.257E-18	2.172E-17	8.329E-17	8.748E-17	3.496E-18	2.228E-24
Ac-227	ΣDOSE(j)		3.778E-13	1.080E-12	2.268E-12	4.731E-12	5.307E-12	1.306E-12	1.556E-14	2.851E-21
0Pb-210	Pb-210	1.000E+00	1.807E-03	1.732E-03	1.592E-03	1.184E-03	5.079E-04	2.627E-05	5.553E-09	7.620E-22

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 38
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		1.807E-03	1.732E-03	1.592E-03	1.184E-03	5.079E-04	2.627E-05	5.553E-09	7.620E-22
0Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06	1.278E-11	3.734E-11	8.228E-11	2.017E-10	3.339E-10	1.809E-10	7.554E-12	8.627E-17
Pb-210	Ra-226	2.771E-10	2.683E-15	7.844E-15	1.728E-14	4.237E-14	7.014E-14	3.801E-14	1.587E-15	1.812E-20
Pb-210	Ra-226	2.637E-10	2.553E-15	7.463E-15	1.644E-14	4.032E-14	6.673E-14	3.616E-14	1.509E-15	1.724E-20
Pb-210	Ra-226	5.538E-14	5.363E-19	1.568E-18	3.454E-18	8.468E-18	1.402E-17	7.595E-18	3.171E-19	3.621E-24
Pb-210	Ra-226	2.640E-13	2.556E-18	7.472E-18	1.646E-17	4.036E-17	6.681E-17	3.620E-17	1.511E-18	1.726E-23
Pb-210	Th-230	1.319E-06	2.648E-13	1.823E-12	9.282E-12	7.274E-11	4.279E-10	1.620E-09	2.302E-09	2.286E-09
Pb-210	Th-230	2.771E-10	5.563E-17	3.830E-16	1.950E-15	1.528E-14	8.987E-14	3.402E-13	4.834E-13	4.801E-13
Pb-210	Th-230	2.637E-10	5.292E-17	3.644E-16	1.855E-15	1.454E-14	8.550E-14	3.237E-13	4.599E-13	4.568E-13
Pb-210	Th-230	5.538E-14	1.112E-20	7.653E-20	3.896E-19	3.053E-18	1.796E-17	6.799E-17	9.661E-17	9.595E-17
Pb-210	Th-230	2.640E-13	5.299E-20	3.648E-19	1.857E-18	1.455E-17	8.561E-17	3.241E-16	4.605E-16	4.573E-16
Pb-210	U-234	1.319E-06	7.295E-21	1.076E-19	1.208E-18	2.789E-17	4.644E-16	4.947E-15	1.118E-14	1.141E-14
Pb-210	U-234	2.771E-10	1.532E-24	2.259E-23	2.536E-22	5.859E-21	9.754E-20	1.039E-18	2.348E-18	2.397E-18
Pb-210	U-234	2.637E-10	1.458E-24	2.149E-23	2.413E-22	5.574E-21	9.280E-20	9.886E-19	2.234E-18	2.280E-18
Pb-210	U-234	5.538E-14	3.062E-28	4.515E-27	5.069E-26	1.171E-24	1.949E-23	2.076E-22	4.693E-22	4.790E-22
Pb-210	U-234	2.640E-13	1.460E-27	2.152E-26	2.416E-25	5.581E-24	9.291E-23	9.898E-22	2.237E-21	2.283E-21
Pb-210	U-238	2.111E-09	6.585E-30	2.006E-28	4.859E-27	3.298E-25	1.570E-23	5.035E-22	2.147E-21	2.333E-21
Pb-210	U-238	4.434E-13	0.000E+00	3.872E-32	1.014E-30	6.928E-29	3.298E-27	1.058E-25	4.509E-25	4.900E-25
Pb-210	U-238	4.219E-13	0.000E+00	3.684E-32	9.647E-31	6.591E-29	3.138E-27	1.006E-25	4.290E-25	4.662E-25
Pb-210	U-238	8.862E-17	0.000E+00	0.000E+00	0.000E+00	1.273E-32	6.547E-31	2.114E-29	9.011E-29	9.791E-29
Pb-210	U-238	4.224E-16	0.000E+00	0.000E+00	0.000E+00	6.066E-32	3.142E-30	1.007E-28	4.295E-28	4.667E-28
Pb-210	U-238	1.317E-06	4.109E-27	1.251E-25	3.032E-24	2.058E-22	9.798E-21	3.142E-19	1.340E-18	1.456E-18
Pb-210	U-238	2.767E-10	8.574E-31	2.629E-29	6.369E-28	4.323E-26	2.058E-24	6.600E-23	2.814E-22	3.057E-22
Pb-210	U-238	2.633E-10	8.158E-31	2.501E-29	6.060E-28	4.113E-26	1.958E-24	6.279E-23	2.677E-22	2.909E-22
Pb-210	U-238	5.530E-14	0.000E+00	0.000E+00	1.170E-31	8.639E-30	4.113E-28	1.319E-26	5.623E-26	6.110E-26
Pb-210	U-238	2.636E-13	0.000E+00	2.302E-32	6.027E-31	4.118E-29	1.960E-27	6.287E-26	2.680E-25	2.912E-25
Pb-210	ΣDOSE(j)		1.305E-11	3.918E-11	9.160E-11	2.746E-10	7.621E-10	1.801E-09	2.310E-09	2.287E-09
0Ra-226	Ra-226	9.996E-01	2.317E-02	2.279E-02	2.206E-02	1.969E-02	1.422E-02	4.550E-03	1.754E-04	1.963E-09
Ra-226	Ra-226	1.319E-06	3.058E-08	3.008E-08	2.912E-08	2.599E-08	1.877E-08	6.006E-09	2.316E-10	2.591E-15
Ra-226	Th-230	9.996E-01	7.188E-04	2.141E-03	4.916E-03	1.395E-02	3.472E-02	7.130E-02	8.714E-02	8.439E-02
Ra-226	Th-230	1.319E-06	9.488E-10	2.826E-09	6.489E-09	1.841E-08	4.583E-08	9.412E-08	1.150E-07	1.114E-07
Ra-226	Th-230	1.899E-08	1.366E-11	4.067E-11	9.341E-11	2.650E-10	6.597E-10	1.355E-09	1.656E-09	1.603E-09
Ra-226	U-234	9.996E-01	2.633E-11	1.823E-10	9.399E-10	7.698E-09	5.069E-08	2.492E-07	4.274E-07	4.213E-07
Ra-226	U-234	1.319E-06	3.475E-17	2.406E-16	1.241E-15	1.016E-14	6.692E-14	3.290E-13	5.642E-13	5.561E-13
Ra-226	U-234	1.899E-08	5.002E-19	3.463E-18	1.786E-17	1.463E-16	9.632E-16	4.736E-15	8.120E-15	8.005E-15
Ra-226	U-238	1.599E-03	2.966E-20	4.392E-19	4.977E-18	1.189E-16	2.163E-15	2.909E-14	8.362E-14	8.612E-14
Ra-226	U-238	2.111E-09	3.915E-26	5.797E-25	6.570E-24	1.569E-22	2.856E-21	3.840E-20	1.104E-19	1.137E-19
Ra-226	U-238	3.039E-11	5.635E-28	8.344E-27	9.457E-26	2.259E-24	4.110E-23	5.527E-22	1.589E-21	1.636E-21
Ra-226	U-238	9.980E-01	1.851E-17	2.740E-16	3.106E-15	7.419E-14	1.350E-12	1.815E-11	5.218E-11	5.374E-11
Ra-226	U-238	1.317E-06	2.443E-23	3.617E-22	4.100E-21	9.793E-20	1.782E-18	2.396E-17	6.888E-17	7.094E-17
Ra-226	U-238	1.896E-08	3.516E-25	5.207E-24	5.901E-23	1.410E-21	2.565E-20	3.449E-19	9.914E-19	1.021E-18
Ra-226	ΣDOSE(j)		2.388E-02	2.493E-02	2.698E-02	3.363E-02	4.894E-02	7.585E-02	8.732E-02	8.439E-02
0Pb-210	Ra-226	9.996E-01	2.472E-05	7.225E-05	1.592E-04	3.903E-04	6.460E-04	3.501E-04	1.461E-05	1.669E-10

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 39
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	5.192E-09	1.518E-08	3.344E-08	8.198E-08	1.357E-07	7.353E-08	3.069E-09	3.505E-14
Pb-210	Ra-226	1.998E-04	4.939E-09	1.444E-08	3.181E-08	7.800E-08	1.291E-07	6.996E-08	2.920E-09	3.335E-14
Pb-210	Ra-226	4.196E-08	1.038E-12	3.033E-12	6.682E-12	1.638E-11	2.712E-11	1.469E-11	6.134E-13	7.005E-18
Pb-210	Ra-226	2.000E-07	4.945E-12	1.446E-11	3.185E-11	7.809E-11	1.293E-10	7.004E-11	2.924E-12	3.339E-17
Pb-210	Th-230	9.996E-01	5.124E-07	3.527E-06	1.796E-05	1.407E-04	8.278E-04	3.134E-03	4.452E-03	4.422E-03
Pb-210	Th-230	2.100E-04	1.076E-10	7.409E-10	3.772E-09	2.956E-08	1.739E-07	6.582E-07	9.352E-07	9.287E-07
Pb-210	Th-230	1.998E-04	1.024E-10	7.049E-10	3.589E-09	2.812E-08	1.654E-07	6.262E-07	8.898E-07	8.836E-07
Pb-210	Th-230	4.196E-08	2.151E-14	1.481E-13	7.538E-13	5.907E-12	3.475E-11	1.315E-10	1.869E-10	1.856E-10
Pb-210	Th-230	2.000E-07	1.025E-13	7.058E-13	3.593E-12	2.816E-11	1.656E-10	6.270E-10	8.909E-10	8.847E-10
Pb-210	U-234	9.996E-01	1.411E-14	2.081E-13	2.336E-12	5.397E-11	8.984E-10	9.571E-09	2.163E-08	2.207E-08
Pb-210	U-234	2.100E-04	2.964E-18	4.371E-17	4.907E-16	1.134E-14	1.887E-13	2.010E-12	4.543E-12	4.637E-12
Pb-210	U-234	1.998E-04	2.820E-18	4.159E-17	4.669E-16	1.078E-14	1.795E-13	1.913E-12	4.322E-12	4.411E-12
Pb-210	U-234	4.196E-08	5.924E-22	8.735E-21	9.806E-20	2.265E-18	3.771E-17	4.017E-16	9.079E-16	9.266E-16
Pb-210	U-234	2.000E-07	2.824E-21	4.164E-20	4.674E-19	1.080E-17	1.798E-16	1.915E-15	4.328E-15	4.417E-15
Pb-210	U-238	1.599E-03	1.274E-23	3.880E-22	9.402E-21	6.381E-19	3.038E-17	9.742E-16	4.153E-15	4.512E-15
Pb-210	U-238	3.359E-07	2.676E-27	8.150E-26	1.975E-24	1.340E-22	6.381E-21	2.046E-19	8.723E-19	9.478E-19
Pb-210	U-238	3.196E-07	2.546E-27	7.754E-26	1.879E-24	1.275E-22	6.071E-21	1.947E-19	8.299E-19	9.017E-19
Pb-210	U-238	6.713E-11	5.265E-31	1.629E-29	3.946E-28	2.679E-26	1.275E-24	4.089E-23	1.743E-22	1.894E-22
Pb-210	U-238	3.200E-10	2.538E-30	7.764E-29	1.881E-27	1.277E-25	6.078E-24	1.949E-22	8.310E-22	9.028E-22
Pb-210	U-238	9.980E-01	7.950E-21	2.421E-19	5.867E-18	3.982E-16	1.896E-14	6.079E-13	2.592E-12	2.816E-12
Pb-210	U-238	2.096E-04	1.670E-24	5.086E-23	1.232E-21	8.364E-20	3.982E-18	1.277E-16	5.443E-16	5.914E-16
Pb-210	U-238	1.994E-04	1.589E-24	4.839E-23	1.172E-21	7.958E-20	3.788E-18	1.215E-16	5.179E-16	5.627E-16
Pb-210	U-238	4.189E-08	3.337E-28	1.016E-26	2.463E-25	1.671E-23	7.957E-22	2.552E-20	1.088E-19	1.182E-19
Pb-210	U-238	1.997E-07	1.591E-27	4.844E-26	1.174E-24	7.967E-23	3.793E-21	1.216E-19	5.185E-19	5.634E-19
Pb-210	ΣDOSE(j)		2.524E-05	7.581E-05	1.772E-04	5.313E-04	1.474E-03	3.485E-03	4.469E-03	4.423E-03
0Ra-226	Ra-226	1.899E-08	4.401E-10	4.330E-10	4.192E-10	3.740E-10	2.701E-10	8.645E-11	3.333E-12	3.729E-17
Ra-226	Ra-226	2.100E-04	1.260E-05	1.239E-05	1.200E-05	1.071E-05	7.731E-06	2.474E-06	9.540E-08	1.067E-12
Ra-226	ΣDOSE(j)		1.260E-05	1.239E-05	1.200E-05	1.071E-05	7.732E-06	2.474E-06	9.541E-08	1.067E-12
0Pb-210	Ra-226	1.899E-08	5.886E-13	1.721E-12	3.791E-12	9.295E-12	1.538E-11	8.336E-12	3.478E-13	3.957E-18
Pb-210	Ra-226	3.989E-12	1.236E-16	3.614E-16	7.963E-16	1.952E-15	3.231E-15	1.751E-15	7.305E-17	8.312E-22
Pb-210	Ra-226	3.795E-12	1.176E-16	3.439E-16	7.576E-16	1.858E-15	3.074E-15	1.666E-15	6.950E-17	7.908E-22
Pb-210	Ra-226	7.972E-16	2.471E-20	7.222E-20	1.591E-19	3.902E-19	6.457E-19	3.499E-19	1.460E-20	1.661E-25
Pb-210	Ra-226	3.800E-15	1.178E-19	3.443E-19	7.585E-19	1.860E-18	3.078E-18	1.668E-18	6.959E-20	7.917E-25
Pb-210	Th-230	1.899E-08	1.220E-14	8.400E-14	4.277E-13	3.351E-12	1.971E-11	7.462E-11	1.060E-10	1.048E-10
Pb-210	Th-230	3.989E-12	2.563E-18	1.764E-17	8.983E-17	7.039E-16	4.141E-15	1.567E-14	2.226E-14	2.202E-14
Pb-210	Th-230	3.795E-12	2.439E-18	1.679E-17	8.547E-17	6.697E-16	3.939E-15	1.491E-14	2.118E-14	2.095E-14
Pb-210	Th-230	7.972E-16	5.122E-22	3.526E-21	1.795E-20	1.407E-19	8.275E-19	3.132E-18	4.448E-18	4.401E-18
Pb-210	Th-230	3.800E-15	2.441E-21	1.681E-20	8.557E-20	6.706E-19	3.944E-18	1.493E-17	2.120E-17	2.098E-17
Pb-210	U-234	1.899E-08	3.361E-22	4.956E-21	5.564E-20	1.285E-18	2.139E-17	2.279E-16	5.148E-16	5.234E-16
Pb-210	U-234	3.989E-12	7.060E-26	1.041E-24	1.169E-23	2.699E-22	4.494E-21	4.787E-20	1.081E-19	1.099E-19
Pb-210	U-234	3.795E-12	6.717E-26	9.904E-25	1.112E-23	2.568E-22	4.276E-21	4.554E-20	1.029E-19	1.046E-19
Pb-210	U-234	7.972E-16	1.411E-29	2.080E-28	2.335E-27	5.394E-26	8.980E-25	9.566E-24	2.161E-23	2.197E-23
Pb-210	U-234	3.800E-15	6.725E-29	9.916E-28	1.113E-26	2.571E-25	4.281E-24	4.560E-23	1.030E-22	1.047E-22
Pb-210	U-238	3.039E-11	3.028E-31	9.240E-30	2.239E-28	1.520E-26	7.234E-25	2.320E-23	9.885E-23	1.070E-22
Pb-210	U-238	6.383E-15	0.000E+00	0.000E+00	4.693E-32	3.186E-30	1.519E-28	4.872E-27	2.076E-26	2.247E-26
Pb-210	U-238	6.073E-15	0.000E+00	0.000E+00	4.465E-32	3.031E-30	1.446E-28	4.636E-27	1.975E-26	2.138E-26
Pb-210	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.160E-32	9.717E-31	4.141E-30	4.482E-30

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 40
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.444E-31	4.632E-30	1.978E-29	2.141E-29
Pb-210	U-238	1.896E-08	1.893E-28	5.766E-27	1.397E-25	9.483E-24	4.514E-22	1.447E-20	6.168E-20	6.676E-20
Pb-210	U-238	3.983E-12	2.829E-32	1.209E-30	2.935E-29	1.992E-27	9.481E-26	3.040E-24	1.296E-23	1.402E-23
Pb-210	U-238	3.789E-12	2.691E-32	1.150E-30	2.792E-29	1.895E-27	9.021E-26	2.893E-24	1.233E-23	1.334E-23
Pb-210	U-238	7.959E-16	0.000E+00	0.000E+00	0.000E+00	3.972E-31	1.895E-29	6.076E-28	2.589E-27	2.802E-27
Pb-210	U-238	3.794E-15	0.000E+00	0.000E+00	1.989E-32	1.894E-30	9.032E-29	2.896E-27	1.234E-26	1.336E-26
Pb-210	ΣDOSE(j)		6.011E-13	1.805E-12	4.220E-12	1.265E-11	3.511E-11	8.299E-11	1.064E-10	1.049E-10
0Ra-226	Ra-226	2.771E-10	1.663E-11	1.636E-11	1.584E-11	1.413E-11	1.021E-11	3.266E-12	1.259E-13	1.408E-18
Ra-226	Ra-226	3.989E-12	2.394E-13	2.355E-13	2.280E-13	2.034E-13	1.469E-13	4.701E-14	1.813E-15	2.027E-20
Ra-226	ΣDOSE(j)		1.687E-11	1.660E-11	1.606E-11	1.433E-11	1.035E-11	3.313E-12	1.277E-13	1.428E-18
0Ra-226	Ra-226	1.998E-04	4.058E-06	3.993E-06	3.865E-06	3.449E-06	2.490E-06	7.969E-07	3.071E-08	3.429E-13
Ra-226	Ra-226	2.637E-10	5.357E-12	5.270E-12	5.101E-12	4.552E-12	3.287E-12	1.052E-12	4.054E-14	4.526E-19
Ra-226	Th-230	1.998E-04	1.259E-07	3.750E-07	8.612E-07	2.443E-06	6.082E-06	1.249E-05	1.525E-05	1.474E-05
Ra-226	Th-230	2.637E-10	1.662E-13	4.950E-13	1.137E-12	3.225E-12	8.029E-12	1.648E-11	2.014E-11	1.946E-11
Ra-226	Th-230	3.795E-12	2.392E-15	7.125E-15	1.636E-14	4.642E-14	1.156E-13	2.373E-13	2.898E-13	2.801E-13
Ra-226	U-234	1.998E-04	4.612E-15	3.193E-14	1.647E-13	1.349E-12	8.880E-12	4.365E-11	7.482E-11	7.360E-11
Ra-226	U-234	2.637E-10	6.088E-21	4.215E-20	2.173E-19	1.780E-18	1.172E-17	5.762E-17	9.876E-17	9.715E-17
Ra-226	U-234	3.795E-12	8.763E-23	6.067E-22	3.128E-21	2.562E-20	1.687E-19	8.294E-19	1.422E-18	1.398E-18
Ra-226	U-238	3.196E-07	5.196E-24	7.693E-23	8.719E-22	2.083E-20	3.789E-19	5.095E-18	1.464E-17	1.504E-17
Ra-226	U-238	4.219E-13	6.856E-30	1.016E-28	1.151E-27	2.749E-26	5.002E-25	6.725E-24	1.932E-23	1.986E-23
Ra-226	U-238	6.073E-15	9.756E-32	1.461E-30	1.656E-29	3.957E-28	7.200E-27	9.680E-26	2.781E-25	2.859E-25
Ra-226	U-238	1.994E-04	3.242E-21	4.801E-20	5.441E-19	1.300E-17	2.365E-16	3.179E-15	9.135E-15	9.388E-15
Ra-226	U-238	2.633E-10	4.279E-27	6.337E-26	7.182E-25	1.716E-23	3.121E-22	4.196E-21	1.206E-20	1.239E-20
Ra-226	U-238	3.789E-12	6.160E-29	9.121E-28	1.034E-26	2.469E-25	4.493E-24	6.040E-23	1.736E-22	1.784E-22
Ra-226	ΣDOSE(j)		4.184E-06	4.368E-06	4.726E-06	5.892E-06	8.573E-06	1.328E-05	1.529E-05	1.474E-05
0Ra-226	Ra-226	3.795E-12	7.710E-14	7.586E-14	7.343E-14	6.552E-14	4.732E-14	1.514E-14	5.836E-16	6.514E-21
Ra-226	Ra-226	4.196E-08	2.398E-09	2.359E-09	2.283E-09	2.037E-09	1.471E-09	4.709E-10	1.815E-11	2.028E-16
Ra-226	ΣDOSE(j)		2.398E-09	2.359E-09	2.283E-09	2.038E-09	1.471E-09	4.709E-10	1.815E-11	2.028E-16
0Ra-226	Ra-226	5.538E-14	3.165E-15	3.114E-15	3.014E-15	2.689E-15	1.942E-15	6.215E-16	2.396E-17	2.677E-22
Ra-226	Ra-226	7.972E-16	4.555E-17	4.482E-17	4.338E-17	3.871E-17	2.796E-17	8.946E-18	3.449E-19	3.854E-24
Ra-226	ΣDOSE(j)		3.210E-15	3.159E-15	3.057E-15	2.728E-15	1.970E-15	6.305E-16	2.431E-17	2.716E-22
0Ra-226	Ra-226	2.000E-07	6.531E-11	6.426E-11	6.220E-11	5.551E-11	4.010E-11	1.285E-11	4.975E-13	5.675E-18
Ra-226	Ra-226	2.640E-13	8.621E-17	8.482E-17	8.210E-17	7.327E-17	5.293E-17	1.696E-17	6.566E-19	7.491E-24
Ra-226	Th-230	2.000E-07	2.026E-12	6.035E-12	1.386E-11	3.932E-11	9.794E-11	2.014E-10	2.471E-10	2.440E-10
Ra-226	Th-230	2.640E-13	2.675E-18	7.967E-18	1.830E-17	5.191E-17	1.293E-16	2.658E-16	3.261E-16	3.221E-16
Ra-226	Th-230	3.800E-15	3.850E-20	1.147E-19	2.633E-19	7.472E-19	1.861E-18	3.826E-18	4.695E-18	4.637E-18
Ra-226	U-234	2.000E-07	7.422E-20	5.139E-19	2.650E-18	2.171E-17	1.430E-16	7.039E-16	1.212E-15	1.218E-15
Ra-226	U-234	2.640E-13	9.797E-26	6.783E-25	3.498E-24	2.865E-23	1.887E-22	9.292E-22	1.600E-21	1.608E-21
Ra-226	U-234	3.800E-15	1.410E-27	9.764E-27	5.035E-26	4.124E-25	2.717E-24	1.337E-23	2.302E-23	2.315E-23
Ra-226	U-238	3.200E-10	8.361E-29	1.238E-27	1.403E-26	3.353E-25	6.102E-24	8.215E-23	2.371E-22	2.490E-22
Ra-226	U-238	4.224E-16	0.000E+00	0.000E+00	1.313E-32	4.333E-31	8.055E-30	1.084E-28	3.130E-28	3.287E-28
Ra-226	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.135E-31	1.561E-30	4.505E-30	4.732E-30
Ra-226	U-238	1.997E-07	5.218E-26	7.726E-25	8.757E-24	2.092E-22	3.808E-21	5.126E-20	1.480E-19	1.554E-19
Ra-226	U-238	2.636E-13	6.743E-32	1.020E-30	1.156E-29	2.761E-28	5.026E-27	6.767E-26	1.953E-25	2.051E-25

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	0.000E+00	1.629E-31	3.975E-30	7.235E-29	9.740E-28	2.811E-27	2.953E-27
Ra-226	ΣDOSE(j)		6.733E-11	7.029E-11	7.606E-11	9.483E-11	1.380E-10	2.142E-10	2.476E-10	2.440E-10
0Ra-226	Ra-226	3.800E-15	1.241E-18	1.221E-18	1.182E-18	1.055E-18	7.619E-19	2.442E-19	9.452E-21	1.078E-25
0Ra-228	Ra-228	1.000E+00	5.688E-04	4.963E-04	3.778E-04	1.454E-04	9.507E-06	6.790E-10	9.671E-22	0.000E+00
Ra-228	Th-232	1.000E+00	9.740E-05	2.755E-04	5.663E-04	1.137E-03	1.470E-03	1.490E-03	1.480E-03	1.437E-03
Ra-228	ΣDOSE(j)		6.662E-04	7.718E-04	9.442E-04	1.282E-03	1.479E-03	1.490E-03	1.480E-03	1.437E-03
0Th-228	Ra-228	1.000E+00	1.582E-04	3.820E-04	5.571E-04	3.568E-04	2.569E-05	1.835E-09	2.608E-21	0.000E+00
Th-228	Th-228	1.000E+00	2.394E-03	1.666E-03	8.066E-04	6.371E-05	4.511E-08	4.263E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	1.839E-05	1.123E-04	4.418E-04	1.590E-03	2.457E-03	2.512E-03	2.490E-03	2.394E-03
Th-228	ΣDOSE(j)		2.571E-03	2.160E-03	1.806E-03	2.010E-03	2.483E-03	2.512E-03	2.490E-03	2.394E-03
0Th-230	Th-230	9.996E-01	3.636E-02	3.636E-02	3.636E-02	3.635E-02	3.633E-02	3.626E-02	3.606E-02	3.537E-02
Th-230	Th-230	1.319E-06	4.800E-08	4.799E-08	4.799E-08	4.798E-08	4.796E-08	4.786E-08	4.760E-08	4.668E-08
Th-230	U-234	9.996E-01	1.991E-09	5.916E-09	1.351E-08	3.758E-08	8.894E-08	1.614E-07	1.798E-07	1.766E-07
Th-230	U-234	1.319E-06	2.629E-15	7.809E-15	1.783E-14	4.961E-14	1.174E-13	2.130E-13	2.373E-13	2.331E-13
Th-230	U-234	1.899E-08	3.784E-17	1.124E-16	2.567E-16	7.141E-16	1.690E-15	3.066E-15	3.416E-15	3.355E-15
Th-230	U-234	2.100E-04	4.183E-13	1.243E-12	2.837E-12	7.894E-12	1.868E-11	3.390E-11	3.776E-11	3.709E-11
Th-230	U-234	2.771E-10	5.521E-19	1.640E-18	3.745E-18	1.042E-17	2.466E-17	4.475E-17	4.985E-17	4.895E-17
Th-230	U-234	3.989E-12	7.947E-21	2.361E-20	5.391E-20	1.500E-19	3.550E-19	6.441E-19	7.175E-19	7.046E-19
Th-230	U-234	1.998E-04	3.980E-13	1.182E-12	2.700E-12	7.511E-12	1.777E-11	3.225E-11	3.593E-11	3.528E-11
Th-230	U-234	2.637E-10	5.253E-19	1.561E-18	3.563E-18	9.914E-18	2.346E-17	4.257E-17	4.743E-17	4.657E-17
Th-230	U-234	3.795E-12	7.561E-21	2.246E-20	5.129E-20	1.427E-19	3.377E-19	6.128E-19	6.826E-19	6.704E-19
Th-230	U-234	4.196E-08	8.359E-17	2.483E-16	5.670E-16	1.578E-15	3.733E-15	6.774E-15	7.546E-15	7.411E-15
Th-230	U-234	5.538E-14	1.103E-22	3.278E-22	7.485E-22	2.082E-21	4.928E-21	8.942E-21	9.961E-21	9.783E-21
Th-230	U-234	7.972E-16	1.588E-24	4.718E-24	1.077E-23	2.997E-23	7.093E-23	1.287E-22	1.434E-22	1.408E-22
Th-230	U-234	2.000E-07	3.984E-16	1.184E-15	2.703E-15	7.520E-15	1.780E-14	3.229E-14	3.597E-14	3.533E-14
Th-230	U-234	2.640E-13	5.259E-22	1.562E-21	3.568E-21	9.926E-21	2.349E-20	4.262E-20	4.748E-20	4.663E-20
Th-230	U-234	3.800E-15	7.570E-24	2.249E-23	5.135E-23	1.429E-22	3.381E-22	6.135E-22	6.835E-22	6.712E-22
Th-230	U-238	1.599E-03	2.988E-18	2.065E-17	1.061E-16	8.574E-16	5.444E-15	2.407E-14	3.643E-14	3.609E-14
Th-230	U-238	2.111E-09	3.944E-24	2.726E-23	1.400E-22	1.132E-21	7.187E-21	3.178E-20	4.809E-20	4.764E-20
Th-230	U-238	3.039E-11	5.676E-26	3.924E-25	2.016E-24	1.629E-23	1.034E-22	4.574E-22	6.922E-22	6.857E-22
Th-230	U-238	3.359E-07	6.275E-22	4.338E-21	2.228E-20	1.801E-19	1.144E-18	5.056E-18	7.652E-18	7.581E-18
Th-230	U-238	4.434E-13	8.283E-28	5.726E-27	2.941E-26	2.377E-25	1.510E-24	6.674E-24	1.010E-23	1.001E-23
Th-230	U-238	6.383E-15	1.192E-29	8.241E-29	4.234E-28	3.422E-27	2.173E-26	9.607E-26	1.454E-25	1.440E-25
Th-230	U-238	3.196E-07	5.970E-22	4.127E-21	2.120E-20	1.713E-19	1.088E-18	4.811E-18	7.280E-18	7.212E-18
Th-230	U-238	4.219E-13	7.881E-28	5.447E-27	2.798E-26	2.262E-25	1.436E-24	6.350E-24	9.610E-24	9.520E-24
Th-230	U-238	6.073E-15	1.134E-29	7.841E-29	4.028E-28	3.256E-27	2.067E-26	9.140E-26	1.383E-25	1.370E-25
Th-230	U-238	6.713E-11	1.254E-25	8.668E-25	4.453E-24	3.599E-23	2.285E-22	1.010E-21	1.529E-21	1.515E-21
Th-230	U-238	8.862E-17	1.639E-31	1.133E-30	5.878E-30	4.751E-29	3.017E-28	1.334E-27	2.019E-27	2.000E-27
Th-230	U-238	1.276E-18	0.000E+00	0.000E+00	8.376E-32	6.769E-31	4.342E-30	1.920E-29	2.905E-29	2.878E-29
Th-230	U-238	3.200E-10	5.978E-25	4.132E-24	2.123E-23	1.716E-22	1.089E-21	4.816E-21	7.289E-21	7.221E-21
Th-230	U-238	4.224E-16	7.811E-31	5.454E-30	2.802E-29	2.265E-28	1.438E-27	6.358E-27	9.622E-27	9.532E-27
Th-230	U-238	6.080E-18	0.000E+00	7.772E-32	3.992E-31	3.260E-30	2.070E-29	9.151E-29	1.385E-28	1.372E-28
Th-230	U-238	9.980E-01	1.864E-15	1.289E-14	6.620E-14	5.350E-13	3.397E-12	1.502E-11	2.273E-11	2.252E-11
Th-230	U-238	1.317E-06	2.461E-21	1.701E-20	8.738E-20	7.062E-19	4.484E-18	1.983E-17	3.001E-17	2.973E-17
Th-230	U-238	1.896E-08	3.542E-23	2.448E-22	1.258E-21	1.017E-20	6.455E-20	2.854E-19	4.319E-19	4.279E-19

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Summary : NC Suburban Resident
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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	3.916E-19	2.707E-18	1.390E-17	1.124E-16	7.136E-16	3.155E-15	4.775E-15	4.730E-15
Th-230	U-238	2.767E-10	5.169E-25	3.573E-24	1.835E-23	1.483E-22	9.419E-22	4.165E-21	6.303E-21	6.244E-21
Th-230	U-238	3.983E-12	7.440E-27	5.143E-26	2.642E-25	2.135E-24	1.356E-23	5.995E-23	9.072E-23	8.988E-23
Th-230	U-238	1.994E-04	3.726E-19	2.575E-18	1.323E-17	1.069E-16	6.789E-16	3.002E-15	4.543E-15	4.501E-15
Th-230	U-238	2.633E-10	4.918E-25	3.399E-24	1.746E-23	1.411E-22	8.962E-22	3.962E-21	5.997E-21	5.941E-21
Th-230	U-238	3.789E-12	7.078E-27	4.893E-26	2.514E-25	2.031E-24	1.290E-23	5.703E-23	8.632E-23	8.551E-23
Th-230	U-238	4.189E-08	7.825E-23	5.409E-22	2.779E-21	2.246E-20	1.426E-19	6.305E-19	9.542E-19	9.453E-19
Th-230	U-238	5.530E-14	1.033E-28	7.140E-28	3.668E-27	2.964E-26	1.882E-25	8.323E-25	1.260E-24	1.248E-24
Th-230	U-238	7.959E-16	1.487E-30	1.028E-29	5.279E-29	4.267E-28	2.709E-27	1.198E-26	1.813E-26	1.796E-26
Th-230	U-238	1.997E-07	3.730E-22	2.578E-21	1.325E-20	1.071E-19	6.797E-19	3.005E-18	4.548E-18	4.506E-18
Th-230	U-238	2.636E-13	4.924E-28	3.403E-27	1.748E-26	1.413E-25	8.973E-25	3.967E-24	6.004E-24	5.948E-24
Th-230	U-238	3.794E-15	7.087E-30	4.899E-29	2.517E-28	2.034E-27	1.292E-26	5.710E-26	8.642E-26	8.561E-26
Th-230	ΣDOSE(j)		3.636E-02	3.636E-02	3.636E-02	3.635E-02	3.633E-02	3.626E-02	3.606E-02	3.537E-02
0Th-230	Th-230	1.899E-08	6.908E-10	6.908E-10	6.908E-10	6.906E-10	6.903E-10	6.889E-10	6.851E-10	6.720E-10
Th-230	Th-230	2.100E-04	7.637E-06	7.637E-06	7.637E-06	7.635E-06	7.631E-06	7.616E-06	7.574E-06	7.428E-06
Th-230	ΣDOSE(j)		7.638E-06	7.638E-06	7.637E-06	7.636E-06	7.632E-06	7.617E-06	7.575E-06	7.429E-06
0Ra-226	Th-230	2.100E-04	3.909E-07	1.164E-06	2.673E-06	7.584E-06	1.888E-05	3.877E-05	4.739E-05	4.587E-05
Ra-226	Th-230	3.989E-12	7.427E-15	2.212E-14	5.080E-14	1.441E-13	3.588E-13	7.367E-13	9.003E-13	8.716E-13
Ra-226	U-234	2.100E-04	1.432E-14	9.913E-14	5.111E-13	4.186E-12	2.757E-11	1.355E-10	2.324E-10	2.290E-10
Ra-226	U-234	2.771E-10	1.890E-20	1.308E-19	6.747E-19	5.526E-18	3.639E-17	1.789E-16	3.068E-16	3.023E-16
Ra-226	U-234	3.989E-12	2.720E-22	1.883E-21	9.712E-21	7.954E-20	5.238E-19	2.575E-18	4.416E-18	4.351E-18
Ra-226	U-238	3.359E-07	1.613E-23	2.388E-22	2.707E-21	6.466E-20	1.176E-18	1.582E-17	4.547E-17	4.681E-17
Ra-226	U-238	4.434E-13	2.129E-29	3.153E-28	3.573E-27	8.535E-26	1.553E-24	2.088E-23	6.002E-23	6.179E-23
Ra-226	U-238	6.383E-15	3.052E-31	4.537E-30	5.142E-29	1.229E-27	2.235E-26	3.006E-25	8.640E-25	8.894E-25
Ra-226	U-238	2.096E-04	1.006E-20	1.490E-19	1.689E-18	4.035E-17	7.341E-16	9.871E-15	2.837E-14	2.921E-14
Ra-226	U-238	2.767E-10	1.329E-26	1.967E-25	2.230E-24	5.326E-23	9.690E-22	1.303E-20	3.745E-20	3.856E-20
Ra-226	U-238	3.983E-12	1.912E-28	2.832E-27	3.209E-26	7.666E-25	1.395E-23	1.876E-22	5.391E-22	5.550E-22
Ra-226	ΣDOSE(j)		3.909E-07	1.164E-06	2.673E-06	7.584E-06	1.888E-05	3.877E-05	4.739E-05	4.587E-05
0Th-230	Th-230	2.771E-10	1.008E-11	1.008E-11	1.008E-11	1.008E-11	1.007E-11	1.005E-11	9.998E-12	9.806E-12
Th-230	Th-230	3.989E-12	1.451E-13	1.451E-13	1.451E-13	1.451E-13	1.450E-13	1.447E-13	1.439E-13	1.411E-13
Th-230	ΣDOSE(j)		1.023E-11	1.023E-11	1.023E-11	1.022E-11	1.022E-11	1.020E-11	1.014E-11	9.947E-12
0Ra-226	Th-230	2.771E-10	5.160E-13	1.537E-12	3.529E-12	1.001E-11	2.493E-11	5.118E-11	6.255E-11	6.055E-11
0Th-230	Th-230	1.998E-04	7.266E-06	7.266E-06	7.266E-06	7.264E-06	7.260E-06	7.246E-06	7.206E-06	7.068E-06
Th-230	Th-230	2.637E-10	9.591E-12	9.591E-12	9.591E-12	9.589E-12	9.583E-12	9.565E-12	9.512E-12	9.329E-12
Th-230	ΣDOSE(j)		7.266E-06	7.266E-06	7.266E-06	7.264E-06	7.260E-06	7.246E-06	7.206E-06	7.068E-06
0Th-230	Th-230	3.795E-12	1.381E-13	1.381E-13	1.380E-13	1.380E-13	1.379E-13	1.377E-13	1.369E-13	1.343E-13
Th-230	Th-230	4.196E-08	1.526E-09	1.526E-09	1.526E-09	1.526E-09	1.525E-09	1.522E-09	1.514E-09	1.485E-09
Th-230	ΣDOSE(j)		1.526E-09	1.526E-09	1.526E-09	1.526E-09	1.525E-09	1.522E-09	1.514E-09	1.485E-09
0Ra-226	Th-230	4.196E-08	7.439E-11	2.216E-10	5.088E-10	1.443E-09	3.594E-09	7.379E-09	9.016E-09	8.721E-09
Ra-226	Th-230	7.972E-16	1.413E-18	4.210E-18	9.667E-18	2.742E-17	6.828E-17	1.402E-16	1.713E-16	1.657E-16
Ra-226	U-234	4.196E-08	2.725E-18	1.887E-17	9.728E-17	7.967E-16	5.247E-15	2.579E-14	4.422E-14	4.354E-14
Ra-226	U-234	5.538E-14	3.597E-24	2.490E-23	1.284E-22	1.052E-21	6.925E-21	3.405E-20	5.837E-20	5.747E-20

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	5.177E-26	3.584E-25	1.848E-24	1.514E-23	9.968E-23	4.901E-22	8.402E-22	8.273E-22
Ra-226	U-238	6.713E-11	3.070E-27	4.545E-26	5.151E-25	1.231E-23	2.239E-22	3.010E-21	8.652E-21	8.900E-21
Ra-226	U-238	8.862E-17	0.000E+00	5.975E-32	6.772E-31	1.624E-29	2.955E-28	3.974E-27	1.142E-26	1.175E-26
Ra-226	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	2.328E-31	4.253E-30	5.719E-29	1.644E-28	1.691E-28
Ra-226	U-238	4.189E-08	1.915E-24	2.836E-23	3.215E-22	7.679E-21	1.397E-19	1.878E-18	5.399E-18	5.554E-18
Ra-226	U-238	5.530E-14	2.518E-30	3.743E-29	4.243E-28	1.014E-26	1.844E-25	2.480E-24	7.126E-24	7.331E-24
Ra-226	U-238	7.959E-16	3.624E-32	5.366E-31	6.107E-30	1.459E-28	2.654E-27	3.569E-26	1.026E-25	1.055E-25
Ra-226	ΣDOSE(j)		7.439E-11	2.216E-10	5.088E-10	1.443E-09	3.594E-09	7.379E-09	9.016E-09	8.722E-09
0Th-230	Th-230	5.538E-14	2.015E-15	2.015E-15	2.014E-15	2.014E-15	2.013E-15	2.009E-15	1.998E-15	1.960E-15
Th-230	Th-230	7.972E-16	2.900E-17	2.900E-17	2.900E-17	2.899E-17	2.897E-17	2.892E-17	2.876E-17	2.821E-17
Th-230	ΣDOSE(j)		2.044E-15	2.044E-15	2.043E-15	2.043E-15	2.042E-15	2.038E-15	2.027E-15	1.988E-15
0Ra-226	Th-230	5.538E-14	9.820E-17	2.925E-16	6.716E-16	1.905E-15	4.744E-15	9.740E-15	1.190E-14	1.151E-14
0Th-230	Th-230	2.000E-07	7.275E-09	7.275E-09	7.274E-09	7.273E-09	7.269E-09	7.255E-09	7.215E-09	7.076E-09
Th-230	Th-230	2.640E-13	9.603E-15	9.603E-15	9.602E-15	9.600E-15	9.595E-15	9.576E-15	9.523E-15	9.341E-15
Th-230	ΣDOSE(j)		7.275E-09	7.275E-09	7.274E-09	7.273E-09	7.269E-09	7.255E-09	7.215E-09	7.076E-09
0Th-230	Th-230	3.800E-15	1.382E-16	1.382E-16	1.382E-16	1.382E-16	1.381E-16	1.378E-16	1.371E-16	1.344E-16
0Th-232	Th-232	1.000E+00	3.907E-05	3.907E-05	3.907E-05	3.906E-05	3.905E-05	3.900E-05	3.885E-05	3.835E-05
0U-234	U-234	9.996E-01	8.289E-05	8.108E-05	7.757E-05	6.644E-05	4.268E-05	9.066E-06	1.084E-07	2.030E-14
U-234	U-234	1.319E-06	1.094E-10	1.070E-10	1.024E-10	8.770E-11	5.633E-11	1.197E-11	1.431E-13	2.679E-20
U-234	U-238	1.599E-03	1.865E-13	5.487E-13	1.226E-12	3.151E-12	5.880E-12	4.116E-12	1.473E-13	9.186E-20
U-234	U-238	2.111E-09	2.462E-19	7.243E-19	1.618E-18	4.159E-18	7.761E-18	5.434E-18	1.944E-19	1.213E-25
U-234	U-238	3.039E-11	3.544E-21	1.043E-20	2.329E-20	5.986E-20	1.117E-19	7.821E-20	2.798E-21	1.745E-27
U-234	U-238	3.359E-07	3.918E-17	1.153E-16	2.575E-16	6.618E-16	1.235E-15	8.646E-16	3.093E-17	1.930E-23
U-234	U-238	4.434E-13	5.172E-23	1.521E-22	3.399E-22	8.736E-22	1.630E-21	1.141E-21	4.083E-23	2.547E-29
U-234	U-238	6.383E-15	7.444E-25	2.190E-24	4.892E-24	1.257E-23	2.347E-23	1.643E-23	5.877E-25	3.604E-31
U-234	U-238	3.196E-07	3.728E-17	1.097E-16	2.450E-16	6.296E-16	1.175E-15	8.226E-16	2.943E-17	1.836E-23
U-234	U-238	4.219E-13	4.921E-23	1.447E-22	3.233E-22	8.311E-22	1.551E-21	1.086E-21	3.885E-23	2.423E-29
U-234	U-238	6.073E-15	7.083E-25	2.083E-24	4.654E-24	1.196E-23	2.233E-23	1.563E-23	5.592E-25	3.429E-31
U-234	U-238	6.713E-11	7.830E-21	2.303E-20	5.145E-20	1.323E-19	2.468E-19	1.728E-19	6.182E-21	3.856E-27
U-234	U-238	8.862E-17	1.034E-26	3.040E-26	6.792E-26	1.746E-25	3.258E-25	2.281E-25	8.160E-27	0.000E+00
U-234	U-238	1.276E-18	1.488E-28	4.376E-28	9.776E-28	2.513E-27	4.689E-27	3.283E-27	1.174E-28	0.000E+00
U-234	U-238	3.200E-10	3.732E-20	1.098E-19	2.453E-19	6.304E-19	1.176E-18	8.236E-19	2.947E-20	1.838E-26
U-234	U-238	4.224E-16	4.927E-26	1.449E-25	3.237E-25	8.321E-25	1.553E-24	1.087E-24	3.889E-26	2.047E-32
U-234	U-238	6.080E-18	7.091E-28	2.086E-27	4.660E-27	1.198E-26	2.235E-26	1.565E-26	5.598E-28	0.000E+00
U-234	U-238	9.980E-01	1.164E-10	3.424E-10	7.649E-10	1.966E-09	3.669E-09	2.569E-09	9.189E-11	5.732E-17
U-234	U-238	1.317E-06	1.536E-16	4.520E-16	1.010E-15	2.595E-15	4.843E-15	3.391E-15	1.213E-16	7.567E-23
U-234	U-238	1.896E-08	2.212E-18	6.506E-18	1.453E-17	3.736E-17	6.971E-17	4.880E-17	1.746E-18	1.089E-24
U-234	U-238	2.096E-04	2.445E-14	7.192E-14	1.607E-13	4.130E-13	7.707E-13	5.395E-13	1.930E-14	1.204E-20
U-234	U-238	2.767E-10	3.227E-20	9.493E-20	2.121E-19	5.451E-19	1.017E-18	7.122E-19	2.548E-20	1.589E-26
U-234	U-238	3.983E-12	4.645E-22	1.366E-21	3.053E-21	7.846E-21	1.464E-20	1.025E-20	3.667E-22	2.288E-28
U-234	U-238	1.994E-04	2.326E-14	6.843E-14	1.529E-13	3.929E-13	7.332E-13	5.133E-13	1.836E-14	1.146E-20
U-234	U-238	2.633E-10	3.071E-20	9.032E-20	2.018E-19	5.186E-19	9.678E-19	6.776E-19	2.424E-20	1.512E-26
U-234	U-238	3.789E-12	4.420E-22	1.300E-21	2.904E-21	7.465E-21	1.393E-20	9.753E-21	3.489E-22	2.177E-28

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 44
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	4.886E-18	1.437E-17	3.211E-17	8.253E-17	1.540E-16	1.078E-16	3.857E-18	2.406E-24
U-234	U-238	5.530E-14	6.449E-24	1.897E-23	4.238E-23	1.089E-22	2.033E-22	1.423E-22	5.092E-24	3.176E-30
U-234	U-238	7.959E-16	9.283E-26	2.731E-25	6.100E-25	1.568E-24	2.926E-24	2.049E-24	7.329E-26	3.857E-32
U-234	U-238	1.997E-07	2.329E-17	6.851E-17	1.530E-16	3.934E-16	7.341E-16	5.139E-16	1.839E-17	1.147E-23
U-234	U-238	2.636E-13	3.074E-23	9.043E-23	2.020E-22	5.193E-22	9.690E-22	6.784E-22	2.427E-23	1.514E-29
U-234	U-238	3.794E-15	4.425E-25	1.302E-24	2.908E-24	7.474E-24	1.395E-23	9.765E-24	3.493E-25	2.142E-31
U-234	ΣDOSE(j)		8.289E-05	8.108E-05	7.757E-05	6.644E-05	4.268E-05	9.068E-06	1.085E-07	2.035E-14
0U-234	U-234	1.899E-08	1.575E-12	1.540E-12	1.474E-12	1.262E-12	8.108E-13	1.722E-13	2.060E-15	3.856E-22
U-234	U-234	2.100E-04	1.741E-08	1.703E-08	1.629E-08	1.395E-08	8.964E-09	1.904E-09	2.278E-11	4.263E-18
U-234	ΣDOSE(j)		1.741E-08	1.703E-08	1.629E-08	1.396E-08	8.965E-09	1.904E-09	2.278E-11	4.263E-18
0U-234	U-234	2.771E-10	2.298E-14	2.248E-14	2.151E-14	1.842E-14	1.183E-14	2.514E-15	3.007E-17	5.627E-24
U-234	U-234	3.989E-12	3.308E-16	3.236E-16	3.096E-16	2.651E-16	1.703E-16	3.618E-17	4.328E-19	8.100E-26
U-234	ΣDOSE(j)		2.331E-14	2.280E-14	2.182E-14	1.868E-14	1.200E-14	2.550E-15	3.050E-17	5.708E-24
0U-234	U-234	1.998E-04	1.657E-08	1.620E-08	1.550E-08	1.328E-08	8.528E-09	1.812E-09	2.167E-11	4.056E-18
U-234	U-234	2.637E-10	2.187E-14	2.139E-14	2.046E-14	1.752E-14	1.126E-14	2.391E-15	2.860E-17	5.354E-24
U-234	ΣDOSE(j)		1.657E-08	1.620E-08	1.550E-08	1.328E-08	8.528E-09	1.812E-09	2.167E-11	4.056E-18
0U-234	U-234	3.795E-12	3.147E-16	3.078E-16	2.945E-16	2.523E-16	1.620E-16	3.442E-17	4.117E-19	7.706E-26
U-234	U-234	4.196E-08	3.479E-12	3.403E-12	3.256E-12	2.789E-12	1.791E-12	3.805E-13	4.552E-15	8.519E-22
U-234	ΣDOSE(j)		3.480E-12	3.404E-12	3.256E-12	2.789E-12	1.791E-12	3.806E-13	4.552E-15	8.520E-22
0U-234	U-234	5.538E-14	4.593E-18	4.492E-18	4.298E-18	3.681E-18	2.365E-18	5.023E-19	6.008E-21	1.125E-27
U-234	U-234	7.972E-16	6.611E-20	6.466E-20	6.186E-20	5.298E-20	3.403E-20	7.230E-21	8.648E-23	1.619E-29
U-234	ΣDOSE(j)		4.659E-18	4.557E-18	4.360E-18	3.734E-18	2.399E-18	5.095E-19	6.095E-21	1.141E-27
0U-234	U-234	2.000E-07	1.659E-11	1.622E-11	1.552E-11	1.329E-11	8.539E-12	1.814E-12	2.170E-14	4.061E-21
U-234	U-234	2.640E-13	2.189E-17	2.141E-17	2.049E-17	1.755E-17	1.127E-17	2.394E-18	2.864E-20	5.360E-27
U-234	ΣDOSE(j)		1.659E-11	1.622E-11	1.552E-11	1.329E-11	8.539E-12	1.814E-12	2.170E-14	4.061E-21
0U-234	U-234	3.800E-15	3.151E-19	3.082E-19	2.949E-19	2.526E-19	1.622E-19	3.446E-20	4.122E-22	7.716E-29
0U-235	U-235	9.835E-01	1.256E-04	1.229E-04	1.176E-04	1.007E-04	6.468E-05	1.374E-05	1.645E-07	3.084E-14
U-235	U-235	2.722E-03	3.477E-07	3.401E-07	3.253E-07	2.787E-07	1.790E-07	3.804E-08	4.554E-10	8.535E-17
U-235	ΣDOSE(j)		1.260E-04	1.232E-04	1.179E-04	1.010E-04	6.486E-05	1.378E-05	1.650E-07	3.092E-14
0U-235	U-235	1.376E-02	1.758E-06	1.719E-06	1.645E-06	1.409E-06	9.050E-07	1.923E-07	2.302E-09	4.315E-16
U-235	U-235	3.809E-05	4.865E-09	4.758E-09	4.552E-09	3.899E-09	2.505E-09	5.323E-10	6.372E-12	1.194E-18
U-235	ΣDOSE(j)		1.763E-06	1.724E-06	1.649E-06	1.413E-06	9.075E-07	1.929E-07	2.309E-09	4.327E-16
0U-235	U-235	8.257E-07	1.055E-10	1.032E-10	9.869E-11	8.453E-11	5.431E-11	1.154E-11	1.381E-13	2.589E-20
U-235	U-235	2.285E-09	2.919E-13	2.855E-13	2.731E-13	2.340E-13	1.503E-13	3.194E-14	3.823E-16	7.166E-23
U-235	ΣDOSE(j)		1.058E-10	1.034E-10	9.897E-11	8.477E-11	5.446E-11	1.157E-11	1.385E-13	2.596E-20
0U-238	U-238	5.450E-07	4.011E-11	3.923E-11	3.753E-11	3.215E-11	2.065E-11	4.388E-12	5.251E-14	9.848E-21
U-238	U-238	1.599E-03	5.136E-05	5.023E-05	4.806E-05	4.116E-05	2.643E-05	5.612E-06	6.700E-08	1.238E-14
U-238	ΣDOSE(j)		5.136E-05	5.023E-05	4.806E-05	4.116E-05	2.643E-05	5.612E-06	6.700E-08	1.238E-14

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	6.779E-11	6.631E-11	6.343E-11	5.433E-11	3.489E-11	7.408E-12	8.844E-14	1.635E-20
U-238	U-238	3.039E-11	9.758E-13	9.544E-13	9.131E-13	7.820E-13	5.022E-13	1.066E-13	1.273E-15	2.353E-22
U-238	ΣDOSE(j)		6.877E-11	6.726E-11	6.435E-11	5.511E-11	3.539E-11	7.515E-12	8.971E-14	1.658E-20
0U-238	U-238	3.359E-07	1.079E-08	1.055E-08	1.009E-08	8.645E-09	5.552E-09	1.179E-09	1.407E-11	2.601E-18
U-238	U-238	4.434E-13	1.424E-14	1.393E-14	1.332E-14	1.141E-14	7.329E-15	1.556E-15	1.858E-17	3.433E-24
U-238	ΣDOSE(j)		1.079E-08	1.055E-08	1.009E-08	8.645E-09	5.552E-09	1.179E-09	1.407E-11	2.601E-18
0U-238	U-238	6.383E-15	2.050E-16	2.005E-16	1.918E-16	1.643E-16	1.055E-16	2.240E-17	2.674E-19	4.942E-26
U-238	U-238	3.196E-07	1.026E-08	1.004E-08	9.603E-09	8.225E-09	5.283E-09	1.122E-09	1.339E-11	2.475E-18
U-238	ΣDOSE(j)		1.026E-08	1.004E-08	9.603E-09	8.225E-09	5.283E-09	1.122E-09	1.339E-11	2.475E-18
0U-238	U-238	4.219E-13	1.355E-14	1.325E-14	1.268E-14	1.086E-14	6.973E-15	1.480E-15	1.767E-17	3.266E-24
U-238	U-238	6.073E-15	1.950E-16	1.907E-16	1.825E-16	1.563E-16	1.004E-16	2.131E-17	2.544E-19	4.702E-26
U-238	ΣDOSE(j)		1.374E-14	1.344E-14	1.286E-14	1.101E-14	7.073E-15	1.502E-15	1.793E-17	3.313E-24
0U-238	U-238	6.713E-11	2.156E-12	2.108E-12	2.017E-12	1.728E-12	1.110E-12	2.356E-13	2.812E-15	5.198E-22
U-238	U-238	8.862E-17	2.845E-18	2.783E-18	2.663E-18	2.280E-18	1.465E-18	3.110E-19	3.712E-21	6.861E-28
U-238	ΣDOSE(j)		2.156E-12	2.108E-12	2.017E-12	1.728E-12	1.110E-12	2.356E-13	2.812E-15	5.198E-22
0U-238	U-238	1.276E-18	4.096E-20	4.006E-20	3.833E-20	3.282E-20	2.108E-20	4.476E-21	5.343E-23	9.873E-30
U-238	U-238	3.200E-10	1.028E-11	1.005E-11	9.615E-12	8.235E-12	5.289E-12	1.123E-12	1.340E-14	2.478E-21
U-238	ΣDOSE(j)		1.028E-11	1.005E-11	9.615E-12	8.235E-12	5.289E-12	1.123E-12	1.340E-14	2.478E-21
0U-238	U-238	4.224E-16	1.356E-17	1.327E-17	1.269E-17	1.087E-17	6.981E-18	1.482E-18	1.769E-20	3.270E-27
U-238	U-238	6.080E-18	1.952E-19	1.910E-19	1.827E-19	1.565E-19	1.005E-19	2.134E-20	2.547E-22	4.707E-29
U-238	ΣDOSE(j)		1.376E-17	1.346E-17	1.287E-17	1.103E-17	7.082E-18	1.504E-18	1.795E-20	3.317E-27
0U-238	U-238	9.980E-01	6.467E-04	6.325E-04	6.051E-04	5.183E-04	3.329E-04	7.069E-05	8.446E-07	1.568E-13
U-238	U-238	1.317E-06	8.536E-10	8.349E-10	7.988E-10	6.841E-10	4.394E-10	9.332E-11	1.115E-12	2.070E-19
U-238	ΣDOSE(j)		6.467E-04	6.325E-04	6.051E-04	5.183E-04	3.329E-04	7.069E-05	8.446E-07	1.568E-13
0U-238	U-238	1.896E-08	1.229E-11	1.202E-11	1.150E-11	9.847E-12	6.325E-12	1.343E-12	1.605E-14	2.980E-21
U-238	U-238	2.096E-04	1.358E-07	1.329E-07	1.271E-07	1.089E-07	6.992E-08	1.485E-08	1.774E-10	3.294E-17
U-238	ΣDOSE(j)		1.358E-07	1.329E-07	1.271E-07	1.089E-07	6.993E-08	1.485E-08	1.774E-10	3.294E-17
0U-238	U-238	2.767E-10	1.793E-13	1.754E-13	1.678E-13	1.437E-13	9.230E-14	1.960E-14	2.342E-16	4.348E-23
U-238	U-238	3.983E-12	2.581E-15	2.524E-15	2.415E-15	2.068E-15	1.329E-15	2.821E-16	3.371E-18	6.259E-25
U-238	ΣDOSE(j)		1.819E-13	1.779E-13	1.702E-13	1.458E-13	9.363E-14	1.988E-14	2.375E-16	4.411E-23
0U-238	U-238	1.994E-04	1.292E-07	1.264E-07	1.209E-07	1.036E-07	6.653E-08	1.413E-08	1.688E-10	3.134E-17
U-238	U-238	2.633E-10	1.706E-13	1.669E-13	1.596E-13	1.367E-13	8.781E-14	1.865E-14	2.228E-16	4.137E-23
U-238	ΣDOSE(j)		1.292E-07	1.264E-07	1.209E-07	1.036E-07	6.653E-08	1.413E-08	1.688E-10	3.134E-17
0U-238	U-238	3.789E-12	2.455E-15	2.402E-15	2.298E-15	1.968E-15	1.264E-15	2.684E-16	3.207E-18	5.955E-25
U-238	U-238	4.189E-08	2.714E-11	2.655E-11	2.540E-11	2.176E-11	1.397E-11	2.967E-12	3.545E-14	6.583E-21
U-238	ΣDOSE(j)		2.715E-11	2.655E-11	2.540E-11	2.176E-11	1.397E-11	2.968E-12	3.546E-14	6.583E-21
0U-238	U-238	5.530E-14	3.583E-17	3.505E-17	3.353E-17	2.872E-17	1.844E-17	3.917E-18	4.680E-20	8.689E-27

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	5.158E-19	5.045E-19	4.826E-19	4.133E-19	2.655E-19	5.638E-20	6.736E-22	1.251E-28
U-238	ΣDOSE(j)		3.635E-17	3.555E-17	3.401E-17	2.913E-17	1.871E-17	3.973E-18	4.747E-20	8.814E-27
0U-238	U-238	1.997E-07	1.294E-10	1.266E-10	1.211E-10	1.037E-10	6.661E-11	1.414E-11	1.690E-13	3.138E-20
U-238	U-238	2.636E-13	1.708E-16	1.671E-16	1.598E-16	1.369E-16	8.792E-17	1.867E-17	2.231E-19	4.142E-26
U-238	ΣDOSE(j)		1.294E-10	1.266E-10	1.211E-10	1.037E-10	6.661E-11	1.414E-11	1.690E-13	3.138E-20
0U-238	U-238	3.794E-15	2.458E-18	2.405E-18	2.300E-18	1.970E-18	1.266E-18	2.688E-19	3.211E-21	5.962E-28

THF(i) is the thread fraction of the parent nuclide.

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	6.884E-03	6.312E-03	5.306E-03	2.890E-03	5.092E-04	1.170E-06	3.375E-14	1.378E-40
Ac-227	Ac-227	2.722E-03	1.905E-05	1.747E-05	1.469E-05	7.998E-06	1.409E-06	3.237E-09	9.341E-17	3.812E-43
Ac-227	Pa-231	9.835E-01	0.000E+00	4.152E-04	1.119E-03	2.587E-03	2.987E-03	7.390E-04	8.821E-06	1.630E-12
Ac-227	U-235	9.835E-01	0.000E+00	1.649E-10	1.361E-09	1.125E-08	4.595E-08	4.923E-08	1.978E-09	1.274E-15
Ac-227	ΣS(j):		6.903E-03	6.745E-03	6.439E-03	5.485E-03	3.498E-03	7.402E-04	8.823E-06	1.631E-12
0Ac-227	Ac-227	1.376E-02	9.633E-05	8.832E-05	7.424E-05	4.044E-05	7.125E-06	1.636E-08	4.723E-16	1.928E-42
Ac-227	Ac-227	3.809E-05	2.666E-07	2.444E-07	2.055E-07	1.119E-07	1.972E-08	4.529E-11	1.307E-18	5.605E-45
Ac-227	Pa-231	1.376E-02	0.000E+00	5.809E-06	1.565E-05	3.620E-05	4.180E-05	1.034E-05	1.234E-07	2.281E-14
Ac-227	U-235	1.376E-02	0.000E+00	2.307E-12	1.905E-11	1.575E-10	6.430E-10	6.888E-10	2.768E-11	1.783E-17
Ac-227	ΣS(j):		9.659E-05	9.437E-05	9.010E-05	7.674E-05	4.894E-05	1.036E-05	1.234E-07	2.282E-14
0Ac-227	Ac-227	8.257E-07	5.780E-09	5.299E-09	4.455E-09	2.426E-09	4.275E-10	9.819E-13	2.834E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.600E-11	1.467E-11	1.233E-11	6.715E-12	1.183E-12	2.718E-15	7.843E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	0.000E+00	3.486E-10	9.391E-10	2.172E-09	2.508E-09	6.204E-10	7.406E-12	1.368E-18
Ac-227	U-235	8.257E-07	0.000E+00	1.384E-16	1.143E-15	9.448E-15	3.858E-14	4.133E-14	1.661E-15	1.070E-21
Ac-227	ΣS(j):		5.796E-09	5.663E-09	5.406E-09	4.605E-09	2.937E-09	6.215E-10	7.407E-12	1.370E-18
0Pa-231	Pa-231	9.835E-01	1.377E-02	1.347E-02	1.288E-02	1.103E-02	7.085E-03	1.503E-03	1.791E-05	3.310E-12
Pa-231	Pa-231	2.722E-03	3.811E-05	3.727E-05	3.566E-05	3.054E-05	1.961E-05	4.160E-06	4.958E-08	9.161E-15
Pa-231	U-235	9.835E-01	0.000E+00	1.058E-08	3.038E-08	8.672E-08	1.671E-07	1.183E-07	4.237E-09	2.629E-15
Pa-231	U-235	2.722E-03	0.000E+00	2.929E-11	8.407E-11	2.400E-10	4.624E-10	3.273E-10	1.173E-11	7.276E-18
Pa-231	U-235	1.376E-02	0.000E+00	1.481E-10	4.250E-10	1.213E-09	2.338E-09	1.655E-09	5.928E-11	3.679E-17
Pa-231	U-235	3.809E-05	0.000E+00	4.099E-13	1.176E-12	3.358E-12	6.470E-12	4.579E-12	1.641E-13	1.018E-19
Pa-231	U-235	8.257E-07	0.000E+00	8.886E-15	2.550E-14	7.281E-14	1.403E-13	9.928E-14	3.557E-15	2.207E-21
Pa-231	U-235	2.285E-09	0.000E+00	2.459E-17	7.058E-17	2.015E-16	3.883E-16	2.748E-16	9.845E-18	6.109E-24
Pa-231	ΣS(j):		1.381E-02	1.350E-02	1.292E-02	1.106E-02	7.104E-03	1.507E-03	1.797E-05	3.322E-12
0Ac-227	Pa-231	2.722E-03	0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.441E-08	4.511E-15
Ac-227	U-235	2.722E-03	0.000E+00	4.564E-13	3.767E-12	3.115E-11	1.272E-10	1.362E-10	5.475E-12	3.527E-18
Ac-227	ΣS(j):		0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.442E-08	4.514E-15
0Pa-231	Pa-231	1.376E-02	1.927E-04	1.884E-04	1.803E-04	1.544E-04	9.913E-05	2.103E-05	2.506E-07	4.632E-14
Pa-231	Pa-231	3.809E-05	5.332E-07	5.215E-07	4.989E-07	4.273E-07	2.744E-07	5.821E-08	6.937E-10	1.282E-16
Pa-231	ΣS(j):		1.932E-04	1.890E-04	1.808E-04	1.548E-04	9.941E-05	2.109E-05	2.513E-07	4.644E-14
0Ac-227	Pa-231	3.809E-05	0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.416E-10	6.312E-17
Ac-227	U-235	3.809E-05	0.000E+00	6.386E-15	5.271E-14	4.358E-13	1.779E-12	1.906E-12	7.661E-14	4.935E-20
Ac-227	ΣS(j):		0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.417E-10	6.317E-17
0Pa-231	Pa-231	8.257E-07	1.156E-08	1.131E-08	1.082E-08	9.263E-09	5.948E-09	1.262E-09	1.504E-11	2.779E-18
Pa-231	Pa-231	2.285E-09	3.199E-11	3.129E-11	2.994E-11	2.564E-11	1.646E-11	3.493E-12	4.162E-14	7.691E-21
Pa-231	ΣS(j):		1.159E-08	1.134E-08	1.085E-08	9.289E-09	5.965E-09	1.265E-09	1.508E-11	2.787E-18
0Ac-227	Pa-231	2.285E-09	0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.787E-21
Ac-227	U-235	2.285E-09	0.000E+00	3.832E-19	3.163E-18	2.615E-17	1.068E-16	1.144E-16	4.597E-18	2.961E-24
Ac-227	ΣS(j):		0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.790E-21
0Pb-210	Pb-210	1.000E+00	8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣS(j):		8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21
0Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06	0.000E+00	2.801E-10	7.926E-10	2.158E-09	3.686E-09	2.017E-09	8.428E-11	9.625E-16
Pb-210	Ra-226	2.771E-10	0.000E+00	5.883E-14	1.665E-13	4.532E-13	7.742E-13	4.237E-13	1.770E-14	2.022E-19
Pb-210	Ra-226	2.637E-10	0.000E+00	5.597E-14	1.584E-13	4.312E-13	7.366E-13	4.031E-13	1.684E-14	1.924E-19
Pb-210	Ra-226	5.538E-14	0.000E+00	1.176E-17	3.327E-17	9.057E-17	1.547E-16	8.467E-17	3.538E-18	4.040E-23
Pb-210	Ra-226	2.640E-13	0.000E+00	5.604E-17	1.586E-16	4.317E-16	7.375E-16	4.036E-16	1.686E-17	1.926E-22
Pb-210	Th-230	1.319E-06	0.000E+00	8.751E-12	7.577E-11	7.368E-10	4.622E-09	1.787E-08	2.547E-08	2.530E-08
Pb-210	Th-230	2.771E-10	0.000E+00	1.838E-15	1.591E-14	1.548E-13	9.708E-13	3.753E-12	5.350E-12	5.313E-12
Pb-210	Th-230	2.637E-10	0.000E+00	1.749E-15	1.514E-14	1.472E-13	9.236E-13	3.570E-12	5.090E-12	5.055E-12
Pb-210	Th-230	5.538E-14	0.000E+00	3.673E-19	3.180E-18	3.093E-17	1.940E-16	7.499E-16	1.069E-15	1.062E-15
Pb-210	Th-230	2.640E-13	0.000E+00	1.751E-18	1.516E-17	1.474E-16	9.247E-16	3.575E-15	5.096E-15	5.061E-15
Pb-210	U-234	1.319E-06	0.000E+00	3.217E-19	8.343E-18	2.689E-16	4.937E-15	5.437E-14	1.237E-13	1.263E-13
Pb-210	U-234	2.771E-10	0.000E+00	6.757E-23	1.752E-21	5.647E-20	1.037E-18	1.142E-17	2.598E-17	2.653E-17
Pb-210	U-234	2.637E-10	0.000E+00	6.428E-23	1.667E-21	5.373E-20	9.866E-19	1.087E-17	2.472E-17	2.524E-17
Pb-210	U-234	5.538E-14	0.000E+00	1.350E-26	3.502E-25	1.129E-23	2.072E-22	2.282E-21	5.192E-21	5.301E-21
Pb-210	U-234	2.640E-13	0.000E+00	6.436E-26	1.669E-24	5.379E-23	9.878E-22	1.088E-20	2.475E-20	2.527E-20
Pb-210	U-238	2.111E-09	0.000E+00	3.631E-28	2.823E-26	3.022E-24	1.642E-22	5.511E-21	2.374E-20	2.581E-20
Pb-210	U-238	4.434E-13	0.000E+00	7.628E-32	5.930E-30	6.348E-28	3.449E-26	1.158E-24	4.987E-24	5.422E-24
Pb-210	U-238	4.219E-13	0.000E+00	7.257E-32	5.642E-30	6.040E-28	3.282E-26	1.101E-24	4.745E-24	5.159E-24
Pb-210	U-238	8.862E-17	0.000E+00	1.524E-35	1.185E-33	1.269E-31	6.893E-30	2.313E-28	9.966E-28	1.084E-27
Pb-210	U-238	4.224E-16	0.000E+00	7.266E-35	5.649E-33	6.047E-31	3.286E-29	1.103E-27	4.751E-27	5.165E-27
Pb-210	U-238	1.317E-06	0.000E+00	2.266E-25	1.762E-23	1.886E-21	1.025E-19	3.439E-18	1.482E-17	1.611E-17
Pb-210	U-238	2.767E-10	0.000E+00	4.760E-29	3.700E-27	3.961E-25	2.152E-23	7.224E-22	3.112E-21	3.383E-21
Pb-210	U-238	2.633E-10	0.000E+00	4.528E-29	3.521E-27	3.769E-25	2.048E-23	6.873E-22	2.961E-21	3.219E-21
Pb-210	U-238	5.530E-14	0.000E+00	9.512E-33	7.395E-31	7.916E-29	4.301E-27	1.444E-25	6.219E-25	6.761E-25
Pb-210	U-238	2.636E-13	0.000E+00	4.534E-32	3.525E-30	3.773E-28	2.050E-26	6.881E-25	2.964E-24	3.223E-24
Pb-210	ΣS(j):		0.000E+00	2.889E-10	8.687E-10	2.896E-09	8.311E-09	1.989E-08	2.557E-08	2.531E-08
0Ra-226	Ra-226	9.996E-01	6.997E-03	6.884E-03	6.664E-03	5.947E-03	4.296E-03	1.377E-03	5.330E-05	6.084E-10
Ra-226	Ra-226	1.319E-06	9.236E-09	9.087E-09	8.797E-09	7.850E-09	5.671E-09	1.817E-09	7.035E-11	8.031E-16
Ra-226	Th-230	9.996E-01	0.000E+00	4.295E-04	1.268E-03	3.996E-03	1.028E-02	2.136E-02	2.626E-02	2.595E-02
Ra-226	Th-230	1.319E-06	0.000E+00	5.670E-10	1.674E-09	5.275E-09	1.356E-08	2.819E-08	3.466E-08	3.426E-08
Ra-226	Th-230	1.899E-08	0.000E+00	8.161E-12	2.409E-11	7.593E-11	1.953E-10	4.058E-10	4.989E-10	4.931E-10
Ra-226	U-234	9.996E-01	0.000E+00	2.359E-11	2.069E-10	2.104E-09	1.479E-08	7.445E-08	1.288E-07	1.296E-07
Ra-226	U-234	1.319E-06	0.000E+00	3.114E-17	2.732E-16	2.778E-15	1.952E-14	9.828E-14	1.700E-13	1.710E-13
Ra-226	U-234	1.899E-08	0.000E+00	4.482E-19	3.932E-18	3.998E-17	2.810E-16	1.415E-15	2.446E-15	2.462E-15
Ra-226	U-238	1.599E-03	0.000E+00	3.544E-20	9.283E-19	3.095E-17	6.215E-16	8.658E-15	2.519E-14	2.648E-14
Ra-226	U-238	2.111E-09	0.000E+00	4.678E-26	1.225E-24	4.085E-23	8.204E-22	1.143E-20	3.325E-20	3.496E-20
Ra-226	U-238	3.039E-11	0.000E+00	6.733E-28	1.764E-26	5.880E-25	1.181E-23	1.645E-22	4.785E-22	5.032E-22
Ra-226	U-238	9.980E-01	0.000E+00	2.211E-17	5.793E-16	1.931E-14	3.878E-13	5.403E-12	1.572E-11	1.653E-11
Ra-226	U-238	1.317E-06	0.000E+00	2.919E-23	7.646E-22	2.549E-20	5.120E-19	7.132E-18	2.075E-17	2.181E-17
Ra-226	U-238	1.896E-08	0.000E+00	4.201E-25	1.101E-23	3.669E-22	7.369E-21	1.027E-19	2.986E-19	3.140E-19
Ra-226	ΣS(j):		6.997E-03	7.314E-03	7.932E-03	9.943E-03	1.457E-02	2.273E-02	2.631E-02	2.595E-02
0Pb-210	Ra-226	9.996E-01	0.000E+00	2.122E-04	6.004E-04	1.635E-03	2.792E-03	1.528E-03	6.385E-05	7.292E-10

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	0.000E+00	4.457E-08	1.261E-07	3.434E-07	5.865E-07	3.210E-07	1.341E-08	1.532E-13
Pb-210	Ra-226	1.998E-04	0.000E+00	4.240E-08	1.200E-07	3.267E-07	5.580E-07	3.054E-07	1.276E-08	1.457E-13
Pb-210	Ra-226	4.196E-08	0.000E+00	8.906E-12	2.520E-11	6.862E-11	1.172E-10	6.414E-11	2.680E-12	3.061E-17
Pb-210	Ra-226	2.000E-07	0.000E+00	4.245E-11	1.201E-10	3.271E-10	5.587E-10	3.057E-10	1.278E-11	1.459E-16
Pb-210	Th-230	9.996E-01	0.000E+00	6.630E-06	5.740E-05	5.582E-04	3.501E-03	1.353E-02	1.930E-02	1.916E-02
Pb-210	Th-230	2.100E-04	0.000E+00	1.393E-09	1.206E-08	1.172E-07	7.354E-07	2.843E-06	4.053E-06	4.025E-06
Pb-210	Th-230	1.998E-04	0.000E+00	1.325E-09	1.147E-08	1.115E-07	6.997E-07	2.705E-06	3.856E-06	3.830E-06
Pb-210	Th-230	4.196E-08	0.000E+00	2.783E-13	2.409E-12	2.343E-11	1.470E-10	5.681E-10	8.099E-10	8.044E-10
Pb-210	Th-230	2.000E-07	0.000E+00	1.327E-12	1.148E-11	1.117E-10	7.005E-10	2.708E-09	3.861E-09	3.834E-09
Pb-210	U-234	9.996E-01	0.000E+00	2.437E-13	6.321E-12	2.037E-10	3.740E-09	4.119E-08	9.371E-08	9.567E-08
Pb-210	U-234	2.100E-04	0.000E+00	5.119E-17	1.328E-15	4.278E-14	7.856E-13	8.652E-12	1.968E-11	2.010E-11
Pb-210	U-234	1.998E-04	0.000E+00	4.870E-17	1.263E-15	4.070E-14	7.474E-13	8.231E-12	1.873E-11	1.912E-11
Pb-210	U-234	4.196E-08	0.000E+00	1.023E-20	2.653E-19	8.549E-18	1.570E-16	1.729E-15	3.934E-15	4.016E-15
Pb-210	U-234	2.000E-07	0.000E+00	4.876E-20	1.265E-18	4.075E-17	7.483E-16	8.241E-15	1.875E-14	1.914E-14
Pb-210	U-238	1.599E-03	0.000E+00	2.751E-22	2.139E-20	2.290E-18	1.244E-16	4.175E-15	1.799E-14	1.956E-14
Pb-210	U-238	3.359E-07	0.000E+00	5.779E-26	4.492E-24	4.809E-22	2.613E-20	8.770E-19	3.778E-18	4.108E-18
Pb-210	U-238	3.196E-07	0.000E+00	5.498E-26	4.274E-24	4.576E-22	2.486E-20	8.344E-19	3.595E-18	3.908E-18
Pb-210	U-238	6.713E-11	0.000E+00	1.155E-29	8.978E-28	9.611E-26	5.222E-24	1.753E-22	7.550E-22	8.209E-22
Pb-210	U-238	3.200E-10	0.000E+00	5.504E-29	4.279E-27	4.581E-25	2.489E-23	8.354E-22	3.599E-21	3.913E-21
Pb-210	U-238	9.980E-01	0.000E+00	1.717E-19	1.335E-17	1.429E-15	7.763E-14	2.605E-12	1.122E-11	1.220E-11
Pb-210	U-238	2.096E-04	0.000E+00	3.606E-23	2.803E-21	3.001E-19	1.631E-17	5.472E-16	2.358E-15	2.563E-15
Pb-210	U-238	1.994E-04	0.000E+00	3.431E-23	2.667E-21	2.855E-19	1.551E-17	5.207E-16	2.243E-15	2.439E-15
Pb-210	U-238	4.189E-08	0.000E+00	7.206E-27	5.602E-25	5.997E-23	3.259E-21	1.094E-19	4.711E-19	5.122E-19
Pb-210	U-238	1.997E-07	0.000E+00	3.435E-26	2.670E-24	2.859E-22	1.553E-20	5.213E-19	2.246E-18	2.442E-18
Pb-210	ΣS(j):		0.000E+00	2.189E-04	6.581E-04	2.194E-03	6.296E-03	1.507E-02	1.937E-02	1.917E-02
0Ra-226	Ra-226	1.899E-08	1.329E-10	1.308E-10	1.266E-10	1.130E-10	8.163E-11	2.616E-11	1.013E-12	1.156E-17
Ra-226	Ra-226	2.100E-04	1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.024E-07	2.892E-07	1.119E-08	1.278E-13
Ra-226	ΣS(j):		1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.025E-07	2.892E-07	1.120E-08	1.278E-13
0Pb-210	Ra-226	1.899E-08	0.000E+00	4.031E-12	1.141E-11	3.106E-11	5.306E-11	2.903E-11	1.213E-12	1.385E-17
Pb-210	Ra-226	3.989E-12	0.000E+00	8.467E-16	2.396E-15	6.524E-15	1.114E-14	6.098E-15	2.548E-16	2.910E-21
Pb-210	Ra-226	3.795E-12	0.000E+00	8.056E-16	2.280E-15	6.207E-15	1.060E-14	5.802E-15	2.424E-16	2.769E-21
Pb-210	Ra-226	7.972E-16	0.000E+00	1.692E-19	4.789E-19	1.304E-18	2.227E-18	1.219E-18	5.092E-20	5.816E-25
Pb-210	Ra-226	3.800E-15	0.000E+00	8.066E-19	2.283E-18	6.214E-18	1.062E-17	5.809E-18	2.427E-19	2.772E-24
Pb-210	Th-230	1.899E-08	0.000E+00	1.260E-13	1.091E-12	1.061E-11	6.652E-11	2.572E-10	3.666E-10	3.641E-10
Pb-210	Th-230	3.989E-12	0.000E+00	2.646E-17	2.291E-16	2.228E-15	1.397E-14	5.401E-14	7.701E-14	7.648E-14
Pb-210	Th-230	3.795E-12	0.000E+00	2.517E-17	2.179E-16	2.119E-15	1.329E-14	5.139E-14	7.326E-14	7.276E-14
Pb-210	Th-230	7.972E-16	0.000E+00	5.287E-21	4.578E-20	4.452E-19	2.792E-18	1.079E-17	1.539E-17	1.528E-17
Pb-210	Th-230	3.800E-15	0.000E+00	2.520E-20	2.182E-19	2.122E-18	1.331E-17	5.145E-17	7.335E-17	7.285E-17
Pb-210	U-234	1.899E-08	0.000E+00	4.630E-21	1.201E-19	3.870E-18	7.106E-17	7.826E-16	1.781E-15	1.818E-15
Pb-210	U-234	3.989E-12	0.000E+00	9.725E-25	2.522E-23	8.128E-22	1.493E-20	1.644E-19	3.740E-19	3.818E-19
Pb-210	U-234	3.795E-12	0.000E+00	9.253E-25	2.400E-23	7.734E-22	1.420E-20	1.564E-19	3.558E-19	3.633E-19
Pb-210	U-234	7.972E-16	0.000E+00	1.944E-28	5.041E-27	1.624E-25	2.983E-24	3.285E-23	7.474E-23	7.630E-23
Pb-210	U-234	3.800E-15	0.000E+00	9.264E-28	2.403E-26	7.743E-25	1.422E-23	1.566E-22	3.563E-22	3.637E-22
Pb-210	U-238	3.039E-11	0.000E+00	5.227E-30	4.064E-28	4.350E-26	2.364E-24	7.933E-23	3.418E-22	3.716E-22
Pb-210	U-238	6.383E-15	0.000E+00	1.098E-33	8.536E-32	9.137E-30	4.965E-28	1.666E-26	7.178E-26	7.805E-26
Pb-210	U-238	6.073E-15	0.000E+00	1.045E-33	8.121E-32	8.694E-30	4.724E-28	1.585E-26	6.830E-26	7.426E-26
Pb-210	U-238	1.276E-18	0.000E+00	2.194E-37	1.706E-35	1.826E-33	9.922E-32	3.330E-30	1.435E-29	1.560E-29

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	1.046E-36	8.131E-35	8.704E-33	4.730E-31	1.587E-29	6.838E-29	7.435E-29
Pb-210	U-238	1.896E-08	0.000E+00	3.262E-27	2.536E-25	2.715E-23	1.475E-21	4.950E-20	2.133E-19	2.319E-19
Pb-210	U-238	3.983E-12	0.000E+00	6.851E-31	5.326E-29	5.702E-27	3.098E-25	1.040E-23	4.479E-23	4.870E-23
Pb-210	U-238	3.789E-12	0.000E+00	6.518E-31	5.068E-29	5.425E-27	2.948E-25	9.893E-24	4.262E-23	4.634E-23
Pb-210	U-238	7.959E-16	0.000E+00	1.369E-34	1.064E-32	1.139E-30	6.191E-29	2.078E-27	8.951E-27	9.732E-27
Pb-210	U-238	3.794E-15	0.000E+00	6.526E-34	5.074E-32	5.431E-30	2.951E-28	9.904E-27	4.267E-26	4.639E-26
Pb-210	ΣS(j):		0.000E+00	4.159E-12	1.250E-11	4.168E-11	1.196E-10	2.863E-10	3.680E-10	3.643E-10
0Ra-226	Ra-226	2.771E-10	1.940E-12	1.909E-12	1.848E-12	1.649E-12	1.191E-12	3.817E-13	1.478E-14	1.687E-19
Ra-226	Ra-226	3.989E-12	2.792E-14	2.747E-14	2.660E-14	2.373E-14	1.715E-14	5.494E-15	2.127E-16	2.428E-21
Ra-226	ΣS(j):		1.968E-12	1.936E-12	1.874E-12	1.673E-12	1.208E-12	3.872E-13	1.499E-14	1.711E-19
0Ra-226	Ra-226	1.998E-04	1.398E-06	1.376E-06	1.332E-06	1.188E-06	8.586E-07	2.751E-07	1.065E-08	1.216E-13
Ra-226	Ra-226	2.637E-10	1.846E-12	1.816E-12	1.758E-12	1.569E-12	1.133E-12	3.632E-13	1.406E-14	1.605E-19
Ra-226	Th-230	1.998E-04	0.000E+00	8.584E-08	2.534E-07	7.986E-07	2.054E-06	4.268E-06	5.247E-06	5.186E-06
Ra-226	Th-230	2.637E-10	0.000E+00	1.133E-13	3.345E-13	1.054E-12	2.711E-12	5.634E-12	6.926E-12	6.846E-12
Ra-226	Th-230	3.795E-12	0.000E+00	1.631E-15	4.814E-15	1.517E-14	3.902E-14	8.109E-14	9.970E-14	9.854E-14
Ra-226	U-234	1.998E-04	0.000E+00	4.714E-15	4.136E-14	4.205E-13	2.956E-12	1.488E-11	2.573E-11	2.589E-11
Ra-226	U-234	2.637E-10	0.000E+00	6.222E-21	5.459E-20	5.551E-19	3.902E-18	1.964E-17	3.397E-17	3.418E-17
Ra-226	U-234	3.795E-12	0.000E+00	8.956E-23	7.858E-22	7.990E-21	5.616E-20	2.827E-19	4.889E-19	4.919E-19
Ra-226	U-238	3.196E-07	0.000E+00	7.082E-24	1.855E-22	6.185E-21	1.242E-19	1.730E-18	5.033E-18	5.293E-18
Ra-226	U-238	4.219E-13	0.000E+00	9.348E-30	2.449E-28	8.164E-27	1.640E-25	2.284E-24	6.644E-24	6.986E-24
Ra-226	U-238	6.073E-15	0.000E+00	1.346E-31	3.525E-30	1.175E-28	2.360E-27	3.288E-26	9.563E-26	1.006E-25
Ra-226	U-238	1.994E-04	0.000E+00	4.419E-21	1.158E-19	3.859E-18	7.751E-17	1.080E-15	3.141E-15	3.303E-15
Ra-226	U-238	2.633E-10	0.000E+00	5.833E-27	1.528E-25	5.094E-24	1.023E-22	1.425E-21	4.146E-21	4.359E-21
Ra-226	U-238	3.789E-12	0.000E+00	8.396E-29	2.199E-27	7.333E-26	1.473E-24	2.051E-23	5.967E-23	6.275E-23
Ra-226	ΣS(j):		1.398E-06	1.462E-06	1.585E-06	1.987E-06	2.912E-06	4.543E-06	5.258E-06	5.186E-06
0Ra-226	Ra-226	3.795E-12	2.657E-14	2.614E-14	2.530E-14	2.258E-14	1.631E-14	5.227E-15	2.024E-16	2.310E-21
Ra-226	Ra-226	4.196E-08	2.937E-10	2.890E-10	2.797E-10	2.496E-10	1.803E-10	5.779E-11	2.237E-12	2.554E-17
Ra-226	ΣS(j):		2.937E-10	2.890E-10	2.797E-10	2.497E-10	1.804E-10	5.779E-11	2.237E-12	2.554E-17
0Ra-226	Ra-226	5.538E-14	3.877E-16	3.814E-16	3.692E-16	3.295E-16	2.380E-16	7.628E-17	2.953E-18	3.371E-23
Ra-226	Ra-226	7.972E-16	5.580E-18	5.490E-18	5.315E-18	4.743E-18	3.426E-18	1.098E-18	4.251E-20	4.852E-25
Ra-226	ΣS(j):		3.933E-16	3.869E-16	3.746E-16	3.343E-16	2.415E-16	7.738E-17	2.996E-18	3.420E-23
0Ra-226	Ra-226	2.000E-07	1.400E-09	1.377E-09	1.333E-09	1.190E-09	8.596E-10	2.755E-10	1.066E-11	1.217E-16
Ra-226	Ra-226	2.640E-13	1.848E-15	1.818E-15	1.760E-15	1.571E-15	1.135E-15	3.636E-16	1.408E-17	1.607E-22
Ra-226	Th-230	2.000E-07	0.000E+00	8.594E-11	2.537E-10	7.996E-10	2.056E-09	4.273E-09	5.254E-09	5.192E-09
Ra-226	Th-230	2.640E-13	0.000E+00	1.134E-16	3.349E-16	1.055E-15	2.714E-15	5.641E-15	6.935E-15	6.854E-15
Ra-226	Th-230	3.800E-15	0.000E+00	1.633E-18	4.820E-18	1.519E-17	3.907E-17	8.119E-17	9.982E-17	9.866E-17
Ra-226	U-234	2.000E-07	0.000E+00	4.720E-18	4.141E-17	4.210E-16	2.959E-15	1.490E-14	2.576E-14	2.592E-14
Ra-226	U-234	2.640E-13	0.000E+00	6.230E-24	5.466E-23	5.558E-22	3.906E-21	1.966E-20	3.401E-20	3.422E-20
Ra-226	U-234	3.800E-15	0.000E+00	8.967E-26	7.867E-25	8.000E-24	5.623E-23	2.830E-22	4.895E-22	4.925E-22
Ra-226	U-238	3.200E-10	0.000E+00	7.090E-27	1.857E-25	6.192E-24	1.244E-22	1.732E-21	5.039E-21	5.299E-21
Ra-226	U-238	4.224E-16	0.000E+00	9.359E-33	2.452E-31	8.174E-30	1.642E-28	2.287E-27	6.652E-27	6.995E-27
Ra-226	U-238	6.080E-18	0.000E+00	1.347E-34	3.529E-33	1.177E-31	2.363E-30	3.292E-29	9.575E-29	1.007E-28
Ra-226	U-238	1.997E-07	0.000E+00	4.424E-24	1.159E-22	3.864E-21	7.760E-20	1.081E-18	3.145E-18	3.307E-18
Ra-226	U-238	2.636E-13	0.000E+00	5.840E-30	1.530E-28	5.100E-27	1.024E-25	1.427E-24	4.151E-24	4.365E-24

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 51
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	8.406E-32	2.202E-30	7.342E-29	1.474E-27	2.054E-26	5.975E-26	6.282E-26
Ra-226	ΣS(j):		1.400E-09	1.463E-09	1.587E-09	1.989E-09	2.916E-09	4.549E-09	5.264E-09	5.193E-09
0Ra-226	Ra-226	3.800E-15	2.660E-17	2.617E-17	2.533E-17	2.261E-17	1.633E-17	5.234E-18	2.026E-19	2.313E-24
0Ra-228	Ra-228	1.000E+00	3.600E-04	3.141E-04	2.391E-04	9.205E-05	6.019E-06	4.303E-10	6.146E-22	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	1.127E-04	2.968E-04	6.579E-04	8.688E-04	8.824E-04	8.792E-04	8.679E-04
Ra-228	ΣS(j):		3.600E-04	4.268E-04	5.359E-04	7.499E-04	8.748E-04	8.824E-04	8.792E-04	8.679E-04
0Th-228	Ra-228	1.000E+00	0.000E+00	1.019E-04	1.888E-04	1.322E-04	9.636E-06	6.896E-10	9.851E-22	0.000E+00
Th-228	Th-228	1.000E+00	1.000E-03	6.959E-04	3.369E-04	2.662E-05	1.886E-08	1.785E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	1.856E-05	1.224E-04	5.358E-04	8.599E-04	8.824E-04	8.792E-04	8.679E-04
Th-228	ΣS(j):		1.000E-03	8.163E-04	6.482E-04	6.946E-04	8.696E-04	8.824E-04	8.792E-04	8.679E-04
0Th-230	Th-230	9.996E-01	9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
Th-230	Th-230	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.318E-06	1.316E-06	1.309E-06	1.283E-06
Th-230	U-234	9.996E-01	0.000E+00	1.091E-07	3.201E-07	9.893E-07	2.417E-06	4.431E-06	4.942E-06	4.854E-06
Th-230	U-234	1.319E-06	0.000E+00	1.440E-13	4.226E-13	1.306E-12	3.190E-12	5.849E-12	6.524E-12	6.407E-12
Th-230	U-234	1.899E-08	0.000E+00	2.073E-15	6.083E-15	1.880E-14	4.592E-14	8.418E-14	9.391E-14	9.222E-14
Th-230	U-234	2.100E-04	0.000E+00	2.291E-11	6.724E-11	2.078E-10	5.077E-10	9.306E-10	1.038E-09	1.020E-09
Th-230	U-234	2.771E-10	0.000E+00	3.025E-17	8.876E-17	2.743E-16	6.701E-16	1.228E-15	1.370E-15	1.346E-15
Th-230	U-234	3.989E-12	0.000E+00	4.353E-19	1.278E-18	3.948E-18	9.646E-18	1.768E-17	1.972E-17	1.937E-17
Th-230	U-234	1.998E-04	0.000E+00	2.180E-11	6.398E-11	1.977E-10	4.830E-10	8.854E-10	9.877E-10	9.700E-10
Th-230	U-234	2.637E-10	0.000E+00	2.878E-17	8.445E-17	2.610E-16	6.376E-16	1.169E-15	1.304E-15	1.280E-15
Th-230	U-234	3.795E-12	0.000E+00	4.142E-19	1.216E-18	3.756E-18	9.177E-18	1.682E-17	1.877E-17	1.843E-17
Th-230	U-234	4.196E-08	0.000E+00	4.579E-15	1.344E-14	4.153E-14	1.015E-13	1.860E-13	2.075E-13	2.037E-13
Th-230	U-234	5.538E-14	0.000E+00	6.044E-21	1.774E-20	5.482E-20	1.339E-19	2.455E-19	2.738E-19	2.689E-19
Th-230	U-234	7.972E-16	0.000E+00	8.700E-23	2.553E-22	7.890E-22	1.928E-21	3.534E-21	3.942E-21	3.871E-21
Th-230	U-234	2.000E-07	0.000E+00	2.183E-14	6.405E-14	1.979E-13	4.836E-13	8.865E-13	9.889E-13	9.712E-13
Th-230	U-234	2.640E-13	0.000E+00	2.881E-20	8.455E-20	2.613E-19	6.383E-19	1.170E-18	1.305E-18	1.282E-18
Th-230	U-234	3.800E-15	0.000E+00	4.147E-22	1.217E-21	3.761E-21	9.188E-21	1.684E-20	1.879E-20	1.845E-20
Th-230	U-238	1.599E-03	0.000E+00	2.455E-16	2.145E-15	2.152E-14	1.458E-13	6.591E-13	1.001E-12	9.922E-13
Th-230	U-238	2.111E-09	0.000E+00	3.240E-22	2.832E-21	2.841E-20	1.925E-19	8.700E-19	1.322E-18	1.310E-18
Th-230	U-238	3.039E-11	0.000E+00	4.664E-24	4.076E-23	4.090E-22	2.770E-21	1.252E-20	1.903E-20	1.885E-20
Th-230	U-238	3.359E-07	0.000E+00	5.156E-20	4.506E-19	4.521E-18	3.063E-17	1.384E-16	2.103E-16	2.084E-16
Th-230	U-238	4.434E-13	0.000E+00	6.806E-26	5.948E-25	5.968E-24	4.043E-23	1.827E-22	2.777E-22	2.751E-22
Th-230	U-238	6.383E-15	0.000E+00	9.797E-28	8.562E-27	8.590E-26	5.819E-25	2.630E-24	3.997E-24	3.960E-24
Th-230	U-238	3.196E-07	0.000E+00	4.906E-20	4.287E-19	4.301E-18	2.914E-17	1.317E-16	2.001E-16	1.983E-16
Th-230	U-238	4.219E-13	0.000E+00	6.476E-26	5.659E-25	5.678E-24	3.846E-23	1.739E-22	2.642E-22	2.617E-22
Th-230	U-238	6.073E-15	0.000E+00	9.321E-28	8.146E-27	8.173E-26	5.537E-25	2.502E-24	3.802E-24	3.767E-24
Th-230	U-238	6.713E-11	0.000E+00	1.030E-23	9.005E-23	9.035E-22	6.121E-21	2.766E-20	4.204E-20	4.165E-20
Th-230	U-238	8.862E-17	0.000E+00	1.360E-29	1.189E-28	1.193E-27	8.079E-27	3.652E-26	5.549E-26	5.497E-26
Th-230	U-238	1.276E-18	0.000E+00	1.958E-31	1.711E-30	1.717E-29	1.163E-28	5.256E-28	7.987E-28	7.913E-28
Th-230	U-238	3.200E-10	0.000E+00	4.912E-23	4.292E-22	4.307E-21	2.917E-20	1.319E-19	2.004E-19	1.985E-19
Th-230	U-238	4.224E-16	0.000E+00	6.484E-29	5.666E-28	5.685E-27	3.851E-26	1.741E-25	2.645E-25	2.620E-25
Th-230	U-238	6.080E-18	0.000E+00	9.332E-31	8.156E-30	8.182E-29	5.543E-28	2.505E-27	3.807E-27	3.772E-27
Th-230	U-238	9.980E-01	0.000E+00	1.532E-13	1.339E-12	1.343E-11	9.099E-11	4.113E-10	6.249E-10	6.191E-10
Th-230	U-238	1.317E-06	0.000E+00	2.022E-19	1.767E-18	1.773E-17	1.201E-16	5.429E-16	8.249E-16	8.173E-16
Th-230	U-238	1.896E-08	0.000E+00	2.911E-21	2.544E-20	2.552E-19	1.729E-18	7.814E-18	1.187E-17	1.176E-17

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:27 Page 52
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	0.000E+00	3.218E-17	2.812E-16	2.821E-15	1.911E-14	8.638E-14	1.313E-13	1.300E-13
Th-230	U-238	2.767E-10	0.000E+00	4.247E-23	3.712E-22	3.724E-21	2.523E-20	1.140E-19	1.733E-19	1.717E-19
Th-230	U-238	3.983E-12	0.000E+00	6.113E-25	5.343E-24	5.360E-23	3.631E-22	1.641E-21	2.494E-21	2.471E-21
Th-230	U-238	1.994E-04	0.000E+00	3.061E-17	2.675E-16	2.684E-15	1.818E-14	8.219E-14	1.249E-13	1.237E-13
Th-230	U-238	2.633E-10	0.000E+00	4.041E-23	3.531E-22	3.543E-21	2.400E-20	1.085E-19	1.648E-19	1.633E-19
Th-230	U-238	3.789E-12	0.000E+00	5.816E-25	5.083E-24	5.100E-23	3.455E-22	1.562E-21	2.373E-21	2.351E-21
Th-230	U-238	4.189E-08	0.000E+00	6.430E-21	5.619E-20	5.638E-19	3.819E-18	1.726E-17	2.623E-17	2.599E-17
Th-230	U-238	5.530E-14	0.000E+00	8.488E-27	7.417E-26	7.442E-25	5.041E-24	2.279E-23	3.462E-23	3.430E-23
Th-230	U-238	7.959E-16	0.000E+00	1.222E-28	1.068E-27	1.071E-26	7.257E-26	3.280E-25	4.984E-25	4.938E-25
Th-230	U-238	1.997E-07	0.000E+00	3.065E-20	2.678E-19	2.687E-18	1.821E-17	8.229E-17	1.250E-16	1.239E-16
Th-230	U-238	2.636E-13	0.000E+00	4.046E-26	3.536E-25	3.547E-24	2.403E-23	1.086E-22	1.650E-22	1.635E-22
Th-230	U-238	3.794E-15	0.000E+00	5.823E-28	5.089E-27	5.106E-26	3.459E-25	1.563E-24	2.376E-24	2.354E-24
Th-230	ΣS(j):		9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
0Th-230	Th-230	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.898E-08	1.894E-08	1.883E-08	1.847E-08
Th-230	Th-230	2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
Th-230	ΣS(j):		2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
0Ra-226	Th-230	2.100E-04	0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
Ra-226	Th-230	3.989E-12	0.000E+00	1.714E-15	5.060E-15	1.595E-14	4.101E-14	8.523E-14	1.048E-13	1.036E-13
Ra-226	U-234	2.100E-04	0.000E+00	4.955E-15	4.347E-14	4.420E-13	3.107E-12	1.564E-11	2.705E-11	2.721E-11
Ra-226	U-234	2.771E-10	0.000E+00	6.540E-21	5.738E-20	5.834E-19	4.101E-18	2.064E-17	3.570E-17	3.592E-17
Ra-226	U-234	3.989E-12	0.000E+00	9.414E-23	8.259E-22	8.398E-21	5.903E-20	2.971E-19	5.139E-19	5.171E-19
Ra-226	U-238	3.359E-07	0.000E+00	7.443E-24	1.950E-22	6.501E-21	1.306E-19	1.819E-18	5.290E-18	5.563E-18
Ra-226	U-238	4.434E-13	0.000E+00	9.825E-30	2.574E-28	8.581E-27	1.723E-25	2.401E-24	6.983E-24	7.343E-24
Ra-226	U-238	6.383E-15	0.000E+00	1.414E-31	3.705E-30	1.235E-28	2.480E-27	3.455E-26	1.005E-25	1.057E-25
Ra-226	U-238	2.096E-04	0.000E+00	4.645E-21	1.217E-19	4.056E-18	8.146E-17	1.135E-15	3.301E-15	3.471E-15
Ra-226	U-238	2.767E-10	0.000E+00	6.131E-27	1.606E-25	5.354E-24	1.075E-22	1.498E-21	4.357E-21	4.582E-21
Ra-226	U-238	3.983E-12	0.000E+00	8.825E-29	2.312E-27	7.707E-26	1.548E-24	2.156E-23	6.272E-23	6.595E-23
Ra-226	ΣS(j):		0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
0Th-230	Th-230	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.769E-10	2.764E-10	2.748E-10	2.696E-10
Th-230	Th-230	3.989E-12	3.989E-12	3.989E-12	3.989E-12	3.988E-12	3.986E-12	3.978E-12	3.956E-12	3.880E-12
Th-230	ΣS(j):		2.811E-10	2.811E-10	2.811E-10	2.811E-10	2.809E-10	2.804E-10	2.788E-10	2.734E-10
0Ra-226	Th-230	2.771E-10	0.000E+00	1.191E-13	3.515E-13	1.108E-12	2.849E-12	5.922E-12	7.280E-12	7.195E-12
0Th-230	Th-230	1.998E-04	1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
Th-230	Th-230	2.637E-10	2.637E-10	2.637E-10	2.637E-10	2.636E-10	2.635E-10	2.630E-10	2.615E-10	2.565E-10
Th-230	ΣS(j):		1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
0Th-230	Th-230	3.795E-12	3.795E-12	3.795E-12	3.795E-12	3.794E-12	3.792E-12	3.785E-12	3.764E-12	3.692E-12
Th-230	Th-230	4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.195E-08	4.192E-08	4.184E-08	4.161E-08	4.081E-08
Th-230	ΣS(j):		4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.193E-08	4.185E-08	4.161E-08	4.081E-08
0Ra-226	Th-230	4.196E-08	0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
Ra-226	Th-230	7.972E-16	0.000E+00	3.426E-19	1.011E-18	3.187E-18	8.196E-18	1.703E-17	2.094E-17	2.070E-17
Ra-226	U-234	4.196E-08	0.000E+00	9.901E-19	8.686E-18	8.833E-17	6.209E-16	3.125E-15	5.405E-15	5.438E-15
Ra-226	U-234	5.538E-14	0.000E+00	1.307E-24	1.147E-23	1.166E-22	8.195E-22	4.125E-21	7.134E-21	7.179E-21

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	0.000E+00	1.881E-26	1.650E-25	1.678E-24	1.180E-23	5.938E-23	1.027E-22	1.033E-22
Ra-226	U-238	6.713E-11	0.000E+00	1.487E-27	3.897E-26	1.299E-24	2.609E-23	3.634E-22	1.057E-21	1.112E-21
Ra-226	U-238	8.862E-17	0.000E+00	1.963E-33	5.144E-32	1.715E-30	3.444E-29	4.797E-28	1.395E-27	1.467E-27
Ra-226	U-238	1.276E-18	0.000E+00	2.826E-35	7.404E-34	2.468E-32	4.957E-31	6.905E-30	2.009E-29	2.112E-29
Ra-226	U-238	4.189E-08	0.000E+00	9.282E-25	2.431E-23	8.106E-22	1.628E-20	2.268E-19	6.597E-19	6.937E-19
Ra-226	U-238	5.530E-14	0.000E+00	1.225E-30	3.210E-29	1.070E-27	2.149E-26	2.994E-25	8.708E-25	9.157E-25
Ra-226	U-238	7.959E-16	0.000E+00	1.764E-32	4.620E-31	1.540E-29	3.093E-28	4.309E-27	1.253E-26	1.318E-26
Ra-226	ΣS(j):		0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
0Th-230	Th-230	5.538E-14	5.538E-14	5.538E-14	5.538E-14	5.537E-14	5.534E-14	5.523E-14	5.493E-14	5.387E-14
Th-230	Th-230	7.972E-16	7.972E-16	7.972E-16	7.971E-16	7.970E-16	7.965E-16	7.950E-16	7.906E-16	7.754E-16
Th-230	ΣS(j):		5.618E-14	5.618E-14	5.618E-14	5.617E-14	5.614E-14	5.603E-14	5.572E-14	5.465E-14
0Ra-226	Th-230	5.538E-14	0.000E+00	2.380E-17	7.025E-17	2.214E-16	5.694E-16	1.183E-15	1.455E-15	1.438E-15
0Th-230	Th-230	2.000E-07	2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
Th-230	Th-230	2.640E-13	2.640E-13	2.640E-13	2.640E-13	2.639E-13	2.638E-13	2.633E-13	2.618E-13	2.568E-13
Th-230	ΣS(j):		2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
0Th-230	Th-230	3.800E-15	3.800E-15	3.800E-15	3.800E-15	3.799E-15	3.797E-15	3.789E-15	3.769E-15	3.696E-15
0Th-232	Th-232	1.000E+00	1.000E-03	1.000E-03	9.999E-04	9.998E-04	9.994E-04	9.981E-04	9.945E-04	9.817E-04
0U-234	U-234	9.996E-01	1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.175E-03	1.312E-03	1.569E-05	2.937E-12
U-234	U-234	1.319E-06	1.583E-08	1.549E-08	1.482E-08	1.269E-08	8.152E-09	1.732E-09	2.071E-11	3.877E-18
U-234	U-238	1.599E-03	0.000E+00	5.300E-11	1.521E-10	4.343E-10	8.370E-10	5.927E-10	2.128E-11	1.329E-17
U-234	U-238	2.111E-09	0.000E+00	6.996E-17	2.008E-16	5.733E-16	1.105E-15	7.824E-16	2.808E-17	1.754E-23
U-234	U-238	3.039E-11	0.000E+00	1.007E-18	2.890E-18	8.252E-18	1.590E-17	1.126E-17	4.042E-19	2.524E-25
U-234	U-238	3.359E-07	0.000E+00	1.113E-14	3.195E-14	9.122E-14	1.758E-13	1.245E-13	4.469E-15	2.791E-21
U-234	U-238	4.434E-13	0.000E+00	1.470E-20	4.218E-20	1.204E-19	2.321E-19	1.643E-19	5.899E-21	3.684E-27
U-234	U-238	6.383E-15	0.000E+00	2.115E-22	6.071E-22	1.733E-21	3.340E-21	2.365E-21	8.491E-23	5.302E-29
U-234	U-238	3.196E-07	0.000E+00	1.059E-14	3.040E-14	8.679E-14	1.673E-13	1.184E-13	4.252E-15	2.655E-21
U-234	U-238	4.219E-13	0.000E+00	1.398E-20	4.013E-20	1.146E-19	2.208E-19	1.564E-19	5.612E-21	3.505E-27
U-234	U-238	6.073E-15	0.000E+00	2.012E-22	5.776E-22	1.649E-21	3.178E-21	2.251E-21	8.078E-23	5.045E-29
U-234	U-238	6.713E-11	0.000E+00	2.225E-18	6.385E-18	1.823E-17	3.513E-17	2.488E-17	8.930E-19	5.577E-25
U-234	U-238	8.862E-17	0.000E+00	2.937E-24	8.429E-24	2.406E-23	4.637E-23	3.284E-23	1.179E-24	7.362E-31
U-234	U-238	1.276E-18	0.000E+00	4.227E-26	1.213E-25	3.464E-25	6.675E-25	4.727E-25	1.697E-26	1.060E-32
U-234	U-238	3.200E-10	0.000E+00	1.060E-17	3.044E-17	8.690E-17	1.675E-16	1.186E-16	4.257E-18	2.658E-24
U-234	U-238	4.224E-16	0.000E+00	1.400E-23	4.018E-23	1.147E-22	2.210E-22	1.565E-22	5.619E-24	3.509E-30
U-234	U-238	6.080E-18	0.000E+00	2.015E-25	5.783E-25	1.651E-24	3.182E-24	2.253E-24	8.088E-26	5.051E-32
U-234	U-238	9.980E-01	0.000E+00	3.307E-08	9.492E-08	2.710E-07	5.223E-07	3.699E-07	1.328E-08	8.291E-15
U-234	U-238	1.317E-06	0.000E+00	4.366E-14	1.253E-13	3.577E-13	6.894E-13	4.882E-13	1.752E-14	1.094E-20
U-234	U-238	1.896E-08	0.000E+00	6.284E-16	1.804E-15	5.149E-15	9.923E-15	7.027E-15	2.522E-16	1.575E-22
U-234	U-238	2.096E-04	0.000E+00	6.947E-12	1.994E-11	5.692E-11	1.097E-10	7.769E-11	2.788E-12	1.741E-18
U-234	U-238	2.767E-10	0.000E+00	9.170E-18	2.632E-17	7.514E-17	1.448E-16	1.025E-16	3.681E-18	2.299E-24
U-234	U-238	3.983E-12	0.000E+00	1.320E-19	3.788E-19	1.082E-18	2.084E-18	1.476E-18	5.298E-20	3.309E-26
U-234	U-238	1.994E-04	0.000E+00	6.609E-12	1.897E-11	5.416E-11	1.044E-10	7.391E-11	2.653E-12	1.657E-18
U-234	U-238	2.633E-10	0.000E+00	8.724E-18	2.504E-17	7.149E-17	1.378E-16	9.756E-17	3.502E-18	2.187E-24
U-234	U-238	3.789E-12	0.000E+00	1.256E-19	3.604E-19	1.029E-18	1.983E-18	1.404E-18	5.041E-20	3.148E-26

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	0.000E+00	1.388E-15	3.984E-15	1.138E-14	2.192E-14	1.552E-14	5.573E-16	3.480E-22
U-234	U-238	5.530E-14	0.000E+00	1.832E-21	5.259E-21	1.502E-20	2.894E-20	2.049E-20	7.356E-22	4.594E-28
U-234	U-238	7.959E-16	0.000E+00	2.638E-23	7.570E-23	2.161E-22	4.165E-22	2.950E-22	1.059E-23	6.612E-30
U-234	U-238	1.997E-07	0.000E+00	6.617E-15	1.899E-14	5.422E-14	1.045E-13	7.400E-14	2.656E-15	1.659E-21
U-234	U-238	2.636E-13	0.000E+00	8.735E-21	2.507E-20	7.157E-20	1.379E-19	9.768E-20	3.506E-21	2.190E-27
U-234	U-238	3.794E-15	0.000E+00	1.257E-22	3.609E-22	1.030E-21	1.985E-21	1.406E-21	5.047E-23	3.152E-29
U-234	ΣS(j):		1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.176E-03	1.312E-03	1.571E-05	2.945E-12
0U-234	U-234	1.899E-08	2.279E-10	2.229E-10	2.133E-10	1.827E-10	1.173E-10	2.493E-11	2.981E-13	5.580E-20
U-234	U-234	2.100E-04	2.519E-06	2.464E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.169E-16
U-234	ΣS(j):		2.520E-06	2.465E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.170E-16
0U-234	U-234	2.771E-10	3.326E-12	3.253E-12	3.112E-12	2.665E-12	1.712E-12	3.637E-13	4.351E-15	8.143E-22
U-234	U-234	3.989E-12	4.787E-14	4.682E-14	4.480E-14	3.837E-14	2.465E-14	5.235E-15	6.262E-17	1.172E-23
U-234	ΣS(j):		3.374E-12	3.300E-12	3.157E-12	2.704E-12	1.737E-12	3.690E-13	4.413E-15	8.260E-22
0U-234	U-234	1.998E-04	2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
U-234	U-234	2.637E-10	3.164E-12	3.095E-12	2.961E-12	2.536E-12	1.629E-12	3.461E-13	4.139E-15	7.748E-22
U-234	ΣS(j):		2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
0U-234	U-234	3.795E-12	4.554E-14	4.455E-14	4.262E-14	3.650E-14	2.345E-14	4.981E-15	5.958E-17	1.115E-23
U-234	U-234	4.196E-08	5.035E-10	4.925E-10	4.712E-10	4.035E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
U-234	ΣS(j):		5.035E-10	4.925E-10	4.712E-10	4.036E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
0U-234	U-234	5.538E-14	6.646E-16	6.501E-16	6.219E-16	5.327E-16	3.422E-16	7.269E-17	8.694E-19	1.627E-25
U-234	U-234	7.972E-16	9.566E-18	9.357E-18	8.952E-18	7.667E-18	4.925E-18	1.046E-18	1.251E-20	2.342E-27
U-234	ΣS(j):		6.742E-16	6.594E-16	6.309E-16	5.403E-16	3.471E-16	7.373E-17	8.820E-19	1.651E-25
0U-234	U-234	2.000E-07	2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
U-234	U-234	2.640E-13	3.168E-15	3.099E-15	2.965E-15	2.539E-15	1.631E-15	3.465E-16	4.144E-18	7.757E-25
U-234	ΣS(j):		2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
0U-234	U-234	3.800E-15	4.560E-17	4.460E-17	4.267E-17	3.655E-17	2.348E-17	4.987E-18	5.965E-20	1.117E-26
0U-235	U-235	9.835E-01	5.114E-04	5.002E-04	4.786E-04	4.099E-04	2.633E-04	5.595E-05	6.696E-07	1.256E-13
U-235	U-235	2.722E-03	1.415E-06	1.384E-06	1.324E-06	1.134E-06	7.288E-07	1.548E-07	1.853E-09	3.475E-16
U-235	ΣS(j):		5.128E-04	5.016E-04	4.799E-04	4.110E-04	2.640E-04	5.610E-05	6.714E-07	1.259E-13
0U-235	U-235	1.376E-02	7.156E-06	6.999E-06	6.696E-06	5.735E-06	3.684E-06	7.828E-07	9.369E-09	1.757E-15
U-235	U-235	3.809E-05	1.980E-08	1.937E-08	1.853E-08	1.587E-08	1.020E-08	2.167E-09	2.593E-11	4.863E-18
U-235	ΣS(j):		7.176E-06	7.019E-06	6.715E-06	5.751E-06	3.695E-06	7.850E-07	9.395E-09	1.762E-15
0U-235	U-235	8.257E-07	4.294E-10	4.200E-10	4.018E-10	3.441E-10	2.211E-10	4.697E-11	5.622E-13	1.054E-19
U-235	U-235	2.285E-09	1.188E-12	1.162E-12	1.112E-12	9.525E-13	6.119E-13	1.300E-13	1.556E-15	2.918E-22
U-235	ΣS(j):		4.306E-10	4.211E-10	4.029E-10	3.451E-10	2.217E-10	4.710E-11	5.637E-13	1.057E-19
0U-238	U-238	5.450E-07	6.540E-09	6.397E-09	6.120E-09	5.242E-09	3.367E-09	7.155E-10	8.563E-12	1.606E-18
U-238	U-238	1.599E-03	1.919E-05	1.877E-05	1.796E-05	1.538E-05	9.882E-06	2.100E-06	2.513E-08	4.713E-15
U-238	ΣS(j):		1.920E-05	1.878E-05	1.797E-05	1.539E-05	9.885E-06	2.100E-06	2.514E-08	4.714E-15

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONCENTRATIONS.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	2.533E-11	2.478E-11	2.371E-11	2.030E-11	1.304E-11	2.771E-12	3.317E-14	6.221E-21
U-238	U-238	3.039E-11	3.647E-13	3.567E-13	3.412E-13	2.923E-13	1.878E-13	3.989E-14	4.774E-16	8.954E-23
U-238	ΣS(j):		2.570E-11	2.514E-11	2.405E-11	2.060E-11	1.323E-11	2.811E-12	3.365E-14	6.310E-21
0U-238	U-238	3.359E-07	4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
U-238	U-238	4.434E-13	5.321E-15	5.205E-15	4.979E-15	4.265E-15	2.740E-15	5.821E-16	6.967E-18	1.307E-24
U-238	ΣS(j):		4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
0U-238	U-238	6.383E-15	7.659E-17	7.492E-17	7.167E-17	6.139E-17	3.944E-17	8.379E-18	1.003E-19	1.881E-26
U-238	U-238	3.196E-07	3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
U-238	ΣS(j):		3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
0U-238	U-238	4.219E-13	5.063E-15	4.952E-15	4.738E-15	4.058E-15	2.607E-15	5.539E-16	6.629E-18	1.243E-24
U-238	U-238	6.073E-15	7.287E-17	7.128E-17	6.819E-17	5.841E-17	3.752E-17	7.972E-18	9.541E-20	1.789E-26
U-238	ΣS(j):		5.136E-15	5.023E-15	4.806E-15	4.116E-15	2.644E-15	5.618E-16	6.724E-18	1.261E-24
0U-238	U-238	6.713E-11	8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
U-238	U-238	8.862E-17	1.063E-18	1.040E-18	9.951E-19	8.523E-19	5.475E-19	1.163E-19	1.392E-21	2.611E-28
U-238	ΣS(j):		8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
0U-238	U-238	1.276E-18	1.531E-20	1.497E-20	1.432E-20	1.227E-20	7.881E-21	1.674E-21	2.004E-23	3.758E-30
U-238	U-238	3.200E-10	3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
U-238	ΣS(j):		3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
0U-238	U-238	4.224E-16	5.069E-18	4.958E-18	4.743E-18	4.063E-18	2.610E-18	5.545E-19	6.637E-21	1.245E-27
U-238	U-238	6.080E-18	7.296E-20	7.136E-20	6.827E-20	5.848E-20	3.757E-20	7.982E-21	9.553E-23	1.791E-29
U-238	ΣS(j):		5.142E-18	5.029E-18	4.812E-18	4.121E-18	2.647E-18	5.625E-19	6.732E-21	1.263E-27
0U-238	U-238	9.980E-01	1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
U-238	U-238	1.317E-06	1.581E-08	1.546E-08	1.479E-08	1.267E-08	8.139E-09	1.729E-09	2.070E-11	3.882E-18
U-238	ΣS(j):		1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
0U-238	U-238	1.896E-08	2.275E-10	2.226E-10	2.129E-10	1.824E-10	1.172E-10	2.489E-11	2.979E-13	5.587E-20
U-238	U-238	2.096E-04	2.515E-06	2.460E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.293E-09	6.177E-16
U-238	ΣS(j):		2.516E-06	2.461E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.294E-09	6.177E-16
0U-238	U-238	2.767E-10	3.320E-12	3.248E-12	3.107E-12	2.661E-12	1.710E-12	3.632E-13	4.347E-15	8.153E-22
U-238	U-238	3.983E-12	4.779E-14	4.675E-14	4.472E-14	3.831E-14	2.461E-14	5.229E-15	6.258E-17	1.174E-23
U-238	ΣS(j):		3.368E-12	3.294E-12	3.152E-12	2.700E-12	1.734E-12	3.685E-13	4.410E-15	8.270E-22
0U-238	U-238	1.994E-04	2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
U-238	U-238	2.633E-10	3.159E-12	3.090E-12	2.956E-12	2.532E-12	1.627E-12	3.456E-13	4.136E-15	7.757E-22
U-238	ΣS(j):		2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
0U-238	U-238	3.789E-12	4.547E-14	4.448E-14	4.255E-14	3.645E-14	2.341E-14	4.975E-15	5.954E-17	1.117E-23
U-238	U-238	4.189E-08	5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.499E-11	6.582E-13	1.234E-19
U-238	ΣS(j):		5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.500E-11	6.582E-13	1.234E-19
0U-238	U-238	5.530E-14	6.636E-16	6.490E-16	6.209E-16	5.318E-16	3.416E-16	7.259E-17	8.688E-19	1.629E-25

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	9.551E-18	9.342E-18	8.938E-18	7.655E-18	4.918E-18	1.045E-18	1.251E-20	2.345E-27
U-238	ΣS(j):		6.731E-16	6.584E-16	6.299E-16	5.395E-16	3.466E-16	7.364E-17	8.813E-19	1.653E-25
0U-238	U-238	1.997E-07	2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
U-238	U-238	2.636E-13	3.163E-15	3.094E-15	2.960E-15	2.535E-15	1.629E-15	3.460E-16	4.141E-18	7.766E-25
U-238	ΣS(j):		2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
0U-238	U-238	3.794E-15	4.553E-17	4.453E-17	4.260E-17	3.649E-17	2.344E-17	4.981E-18	5.961E-20	1.118E-26

THF(i) is the thread fraction of the parent nuclide.
0RESCALC.EXE execution time = 125.02 seconds

DCFPAK 3.02 (Adult) – Risk

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Part III: Intake Quantities and Health Risk Factors

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Cancer Risk Slope Factors Summary Table
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.63E-06	1.98E-10	SLPF(1,1)
Sf-1	Ac-227+D1	1.65E-06	1.98E-10	SLPF(2,1)
Sf-1	Ac-227+D2	1.32E-06	1.98E-10	SLPF(3,1)
Sf-1	Ac-227+D3	1.34E-06	1.98E-10	SLPF(4,1)
Sf-1	Ac-227+D4	1.72E-06	1.98E-10	SLPF(5,1)
Sf-1	Ac-227+D5	1.74E-06	1.98E-10	SLPF(6,1)
Sf-1	Pa-231	1.27E-07	1.27E-07	SLPF(7,1)
Sf-1	Pb-210+D	4.30E-09	1.48E-09	SLPF(13,1)
Sf-1	Pb-210+D1	4.30E-09	1.48E-09	SLPF(14,1)
Sf-1	Pb-210+D2	1.04E-08	1.48E-09	SLPF(15,1)
Sf-1	Pb-210+D3	4.91E-07	1.48E-09	SLPF(16,1)
Sf-1	Ra-226+D	8.36E-06	2.50E-08	SLPF(17,1)
Sf-1	Ra-226+D1	2.18E-05	2.50E-08	SLPF(20,1)
Sf-1	Ra-226+D2	7.37E-06	2.50E-08	SLPF(23,1)
Sf-1	Ra-226+D3	2.08E-05	2.50E-08	SLPF(26,1)
Sf-1	Ra-226+D4	3.05E-08	2.50E-08	SLPF(29,1)
Sf-1	Ra-228+D	4.04E-06	3.43E-11	SLPF(32,1)
Sf-1	Th-228+D	7.33E-06	5.64E-09	SLPF(33,1)
Sf-1	Th-230	8.45E-10	8.45E-10	SLPF(34,1)
Sf-1	Th-232	3.58E-10	3.58E-10	SLPF(49,1)
Sf-1	U-234	2.53E-10	2.53E-10	SLPF(50,1)
Sf-1	U-235+D	5.76E-07	5.51E-07	SLPF(65,1)
Sf-1	U-238	1.24E-10	1.24E-10	SLPF(71,1)
Sf-1	U-238+D	6.73E-06	1.24E-10	SLPF(72,1)
Sf-1	U-238+D1	1.08E-07	1.24E-10	SLPF(87,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.14E-07	1.49E-07	SLPF(1,2)
Sf-2	Ac-227+D1	2.14E-07	1.49E-07	SLPF(2,2)
Sf-2	Ac-227+D2	1.79E-07	1.49E-07	SLPF(3,2)
Sf-2	Ac-227+D3	1.79E-07	1.49E-07	SLPF(4,2)
Sf-2	Ac-227+D4	1.50E-07	1.49E-07	SLPF(5,2)
Sf-2	Ac-227+D5	1.50E-07	1.49E-07	SLPF(6,2)
Sf-2	Pa-231	7.62E-08	7.62E-08	SLPF(7,2)
Sf-2	Pb-210+D	3.08E-08	1.59E-08	SLPF(13,2)
Sf-2	Pb-210+D1	3.08E-08	1.59E-08	SLPF(14,2)
Sf-2	Pb-210+D2	1.63E-08	1.59E-08	SLPF(15,2)
Sf-2	Pb-210+D3	1.59E-08	1.59E-08	SLPF(16,2)
Sf-2	Ra-226+D	2.82E-08	2.81E-08	SLPF(17,2)
Sf-2	Ra-226+D1	2.82E-08	2.81E-08	SLPF(20,2)
Sf-2	Ra-226+D2	2.82E-08	2.81E-08	SLPF(23,2)
Sf-2	Ra-226+D3	2.82E-08	2.81E-08	SLPF(26,2)
Sf-2	Ra-226+D4	2.81E-08	2.81E-08	SLPF(29,2)
Sf-2	Ra-228+D	4.37E-08	4.37E-08	SLPF(32,2)
Sf-2	Th-228+D	1.44E-07	1.32E-07	SLPF(33,2)
Sf-2	Th-230	3.41E-08	3.41E-08	SLPF(34,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(49,2)
Sf-2	U-234	2.78E-08	2.78E-08	SLPF(50,2)
Sf-2	U-235+D	2.50E-08	2.50E-08	SLPF(65,2)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-2	U-238	2.36E-08	2.36E-08	SLPF(71,2)
Sf-2	U-238+D	2.37E-08	2.36E-08	SLPF(72,2)
Sf-2	U-238+D1	2.37E-08	2.36E-08	SLPF(87,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.55E-10	2.45E-10	SLPF(1,3)
Sf-3	Ac-227+D1	6.55E-10	2.45E-10	SLPF(2,3)
Sf-3	Ac-227+D2	5.94E-10	2.45E-10	SLPF(3,3)
Sf-3	Ac-227+D3	5.94E-10	2.45E-10	SLPF(4,3)
Sf-3	Ac-227+D4	2.56E-10	2.45E-10	SLPF(5,3)
Sf-3	Ac-227+D5	2.56E-10	2.45E-10	SLPF(6,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(7,3)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(13,3)
Sf-3	Pb-210+D1	3.44E-09	1.18E-09	SLPF(14,3)
Sf-3	Pb-210+D2	1.19E-09	1.18E-09	SLPF(15,3)
Sf-3	Pb-210+D3	1.18E-09	1.18E-09	SLPF(16,3)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(17,3)
Sf-3	Ra-226+D1	5.15E-10	5.14E-10	SLPF(20,3)
Sf-3	Ra-226+D2	5.14E-10	5.14E-10	SLPF(23,3)
Sf-3	Ra-226+D3	5.14E-10	5.14E-10	SLPF(26,3)
Sf-3	Ra-226+D4	5.14E-10	5.14E-10	SLPF(29,3)
Sf-3	Ra-228+D	1.43E-09	1.42E-09	SLPF(32,3)
Sf-3	Th-228+D	4.23E-10	1.48E-10	SLPF(33,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(34,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(49,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(50,3)
Sf-3	U-235+D	9.76E-11	9.43E-11	SLPF(65,3)
Sf-3	U-238	8.66E-11	8.66E-11	SLPF(71,3)
Sf-3	U-238+D	1.24E-10	8.66E-11	SLPF(72,3)
Sf-3	U-238+D1	1.20E-10	8.66E-11	SLPF(87,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.88E-10	2.01E-10	SLPF(1,4)
Sf-3	Ac-227+D1	4.88E-10	2.01E-10	SLPF(2,4)
Sf-3	Ac-227+D2	4.47E-10	2.01E-10	SLPF(3,4)
Sf-3	Ac-227+D3	4.47E-10	2.01E-10	SLPF(4,4)
Sf-3	Ac-227+D4	2.09E-10	2.01E-10	SLPF(5,4)
Sf-3	Ac-227+D5	2.09E-10	2.01E-10	SLPF(6,4)
Sf-3	Pa-231	1.72E-10	1.72E-10	SLPF(7,4)
Sf-3	Pb-210+D	2.67E-09	8.84E-10	SLPF(13,4)
Sf-3	Pb-210+D1	2.67E-09	8.84E-10	SLPF(14,4)
Sf-3	Pb-210+D2	8.93E-10	8.84E-10	SLPF(15,4)
Sf-3	Pb-210+D3	8.84E-10	8.84E-10	SLPF(16,4)
Sf-3	Ra-226+D	3.85E-10	3.85E-10	SLPF(17,4)
Sf-3	Ra-226+D1	3.85E-10	3.85E-10	SLPF(20,4)
Sf-3	Ra-226+D2	3.85E-10	3.85E-10	SLPF(23,4)
Sf-3	Ra-226+D3	3.85E-10	3.85E-10	SLPF(26,4)
Sf-3	Ra-226+D4	3.85E-10	3.85E-10	SLPF(29,4)
Sf-3	Ra-228+D	1.04E-09	1.04E-09	SLPF(32,4)
Sf-3	Th-228+D	3.00E-10	1.08E-10	SLPF(33,4)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-3	Th-230	9.14E-11	9.14E-11	SLPF(34,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(49,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(50,4)
Sf-3	U-235+D	7.17E-11	6.95E-11	SLPF(65,4)
Sf-3	U-238	6.40E-11	6.40E-11	SLPF(71,4)
Sf-3	U-238+D	8.92E-11	6.40E-11	SLPF(72,4)
Sf-3	U-238+D1	8.71E-11	6.40E-11	SLPF(87,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.55E-10	2.45E-10	SLPF(1,5)
Sf-3	Ac-227+D1	6.55E-10	2.45E-10	SLPF(2,5)
Sf-3	Ac-227+D2	5.94E-10	2.45E-10	SLPF(3,5)
Sf-3	Ac-227+D3	5.94E-10	2.45E-10	SLPF(4,5)
Sf-3	Ac-227+D4	2.56E-10	2.45E-10	SLPF(5,5)
Sf-3	Ac-227+D5	2.56E-10	2.45E-10	SLPF(6,5)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(7,5)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(13,5)
Sf-3	Pb-210+D1	3.44E-09	1.18E-09	SLPF(14,5)
Sf-3	Pb-210+D2	1.19E-09	1.18E-09	SLPF(15,5)
Sf-3	Pb-210+D3	1.18E-09	1.18E-09	SLPF(16,5)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(17,5)
Sf-3	Ra-226+D1	5.15E-10	5.14E-10	SLPF(20,5)
Sf-3	Ra-226+D2	5.14E-10	5.14E-10	SLPF(23,5)
Sf-3	Ra-226+D3	5.14E-10	5.14E-10	SLPF(26,5)
Sf-3	Ra-226+D4	5.14E-10	5.14E-10	SLPF(29,5)
Sf-3	Ra-228+D	1.43E-09	1.42E-09	SLPF(32,5)
Sf-3	Th-228+D	4.23E-10	1.48E-10	SLPF(33,5)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(34,5)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(49,5)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(50,5)
Sf-3	U-235+D	9.76E-11	9.43E-11	SLPF(65,5)
Sf-3	U-238	8.66E-11	8.66E-11	SLPF(71,5)
Sf-3	U-238+D	1.24E-10	8.66E-11	SLPF(72,5)
Sf-3	U-238+D1	1.20E-10	8.66E-11	SLPF(87,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	3.88E+02	3.88E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	3.88E+02	3.88E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.88E+02	1.88E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	1.88E+02	1.88E+02	KFACTR(2,2)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Risk Slope and Environmental Transport Factors for the Ground Pathway

0Nuclide (i)	Slope(i)* t=	ETFG(i,t) At Time in Years (dimensionless) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.990E-10	3.328E-01	3.328E-01	3.328E-01	3.328E-01	3.328E-01	3.329E-01	3.330E-01	3.331E-01
Ac-228	4.040E-06	3.183E-01	3.183E-01	3.183E-01	3.183E-01	3.182E-01	3.179E-01	3.169E-01	3.115E-01
At-218	2.740E-11	3.272E-01	3.272E-01	3.272E-01	3.272E-01	3.272E-01	3.273E-01	3.273E-01	3.269E-01
At-219	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Bi-210	2.770E-09	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.290E-01	3.291E-01	3.293E-01	3.298E-01
Bi-211	1.900E-07	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.266E-01	3.247E-01
Bi-212	4.960E-07	3.189E-01	3.189E-01	3.189E-01	3.189E-01	3.188E-01	3.185E-01	3.175E-01	3.120E-01
Bi-214	7.340E-06	3.153E-01	3.153E-01	3.153E-01	3.152E-01	3.151E-01	3.147E-01	3.132E-01	3.062E-01
Bi-215	1.080E-06	3.242E-01	3.242E-01	3.241E-01	3.241E-01	3.241E-01	3.239E-01	3.233E-01	3.197E-01
Fr-223	1.350E-07	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.285E-01	3.274E-01
Hg-206	4.830E-07	3.278E-01	3.278E-01	3.278E-01	3.278E-01	3.277E-01	3.277E-01	3.275E-01	3.257E-01
Pa-231	1.270E-07	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.282E-01	3.269E-01
Pa-234	6.620E-06	3.204E-01	3.204E-01	3.203E-01	3.203E-01	3.203E-01	3.200E-01	3.192E-01	3.145E-01
Pa-234m	9.060E-08	3.210E-01	3.210E-01	3.210E-01	3.210E-01	3.209E-01	3.207E-01	3.199E-01	3.156E-01
Pb-210	1.480E-09	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Pb-211	2.910E-07	3.224E-01	3.224E-01	3.224E-01	3.224E-01	3.223E-01	3.222E-01	3.216E-01	3.179E-01
Pb-212	4.960E-07	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.284E-01
Pb-214	9.940E-07	3.277E-01	3.277E-01	3.277E-01	3.277E-01	3.277E-01	3.276E-01	3.274E-01	3.255E-01
Po-210	4.510E-11	3.205E-01	3.205E-01	3.205E-01	3.205E-01	3.204E-01	3.201E-01	3.193E-01	3.144E-01
Po-211	3.760E-08	3.202E-01	3.202E-01	3.202E-01	3.202E-01	3.201E-01	3.199E-01	3.191E-01	3.145E-01
Po-212	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-214	3.850E-10	3.206E-01	3.206E-01	3.206E-01	3.206E-01	3.205E-01	3.203E-01	3.196E-01	3.151E-01
Po-215	7.480E-10	3.253E-01	3.253E-01	3.253E-01	3.252E-01	3.252E-01	3.251E-01	3.248E-01	3.224E-01
Po-216	7.100E-11	3.207E-01	3.207E-01	3.207E-01	3.207E-01	3.206E-01	3.204E-01	3.196E-01	3.148E-01
Po-218	6.840E-15	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01
Ra-223	4.550E-07	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.283E-01
Ra-224	3.910E-08	3.288E-01	3.288E-01	3.288E-01	3.288E-01	3.289E-01	3.289E-01	3.289E-01	3.281E-01
Ra-226	2.500E-08	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.295E-01	3.295E-01	3.293E-01
Ra-228	3.430E-11	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Rn-218	3.390E-09	3.223E-01	3.223E-01	3.223E-01	3.223E-01	3.222E-01	3.221E-01	3.215E-01	3.180E-01
Rn-219	2.350E-07	3.279E-01	3.279E-01	3.279E-01	3.279E-01	3.279E-01	3.278E-01	3.276E-01	3.259E-01
Rn-220	2.770E-09	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.233E-01	3.228E-01	3.197E-01
Rn-222	1.690E-09	3.244E-01	3.244E-01	3.244E-01	3.244E-01	3.243E-01	3.243E-01	3.239E-01	3.214E-01
Th-227	4.450E-07	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.288E-01	3.279E-01
Th-228	5.640E-09	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.306E-01	3.307E-01
Th-230	8.450E-10	3.309E-01	3.309E-01	3.309E-01	3.309E-01	3.310E-01	3.310E-01	3.311E-01	3.311E-01
Th-231	2.490E-08	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.418E-01	3.417E-01
Th-232	3.580E-10	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.418E-01
Th-234	1.780E-08	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01
Tl-206	6.110E-09	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.276E-01	3.277E-01	3.280E-01	3.286E-01
Tl-207	1.590E-08	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.233E-01	3.232E-01	3.228E-01	3.202E-01
Tl-208	1.750E-05	3.089E-01	3.089E-01	3.089E-01	3.088E-01	3.086E-01	3.080E-01	3.061E-01	2.972E-01
Tl-210	1.340E-05	3.163E-01	3.163E-01	3.163E-01	3.162E-01	3.161E-01	3.157E-01	3.144E-01	3.079E-01
U-234	2.530E-10	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.414E-01
U-235	5.510E-07	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.295E-01	3.295E-01	3.296E-01	3.294E-01
U-238	1.240E-10	3.321E-01	3.321E-01	3.321E-01	3.321E-01	3.320E-01	3.319E-01	3.316E-01	3.296E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.959E-04	0.000E+00	0.000E+00	0.000E+00	2.253E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-01
Pa-231	3.919E-04	0.000E+00	0.000E+00	0.000E+00	4.506E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.506E-01
Pb-210	2.239E-04	0.000E+00	0.000E+00	0.000E+00	2.575E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.575E-01
Ra-226	1.959E-04	0.000E+00	0.000E+00	0.000E+00	2.253E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-01
Ra-228	1.008E-05	0.000E+00	0.000E+00	0.000E+00	1.159E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.159E-02
Th-228	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.359E-04	0.000E+00	0.000E+00	0.000E+00	3.863E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.863E-01
U-235	1.456E-05	0.000E+00	0.000E+00	0.000E+00	1.674E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.674E-02
U-238	3.359E-04	0.000E+00	0.000E+00	0.000E+00	3.863E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.863E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.115E-08	0.0642	9.087E-10	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-09	0.0025
Pa-231	1.279E-08	0.0101	6.546E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.229E-09	0.0018
Pb-210	3.333E-10	0.0003	2.009E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.579E-08	0.0204
Ra-226	8.819E-07	0.6972	2.630E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.518E-09	0.0044
Ra-228	2.923E-08	0.0231	2.782E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-09	0.0008
Th-228	5.263E-08	0.0416	9.338E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.144E-10	0.0002
Th-230	8.386E-09	0.0066	2.860E-08	0.0226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.150E-07	0.0909
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.286E-10	0.0001
U-234	2.273E-11	0.0000	2.049E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.083E-10	0.0006
U-235	2.166E-09	0.0017	7.982E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.580E-11	0.0000
U-238	1.010E-08	0.0080	1.743E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.020E-09	0.0008
Total	1.079E-06	0.8528	3.117E-08	0.0246	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-07	0.1226

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.526E-08	0.0674
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.568E-08	0.0124
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.633E-08	0.0208
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.876E-07	0.7017
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.031E-08	0.0240
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.304E-08	0.0419
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-07	0.1201
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.210E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-08	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.981E-08	0.0315	4.458E-10	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.572E-09	0.0012
Pa-231	5.413E-08	0.0428	1.118E-09	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.861E-09	0.0031
Pb-210	1.946E-10	0.0002	1.173E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.506E-08	0.0119
Ra-226	4.403E-07	0.3481	1.801E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.027E-09	0.0071
Ra-228	9.193E-09	0.0073	1.356E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.542E-10	0.0001
Th-228	6.286E-09	0.0050	1.115E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.755E-11	0.0000
Th-230	4.501E-07	0.3558	2.877E-08	0.0227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.222E-07	0.0966
Th-232	6.639E-08	0.0525	1.328E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.295E-09	0.0010
U-234	2.317E-11	0.0000	2.049E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.084E-10	0.0006
U-235	2.167E-09	0.0017	7.993E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.584E-11	0.0000
U-238	1.010E-08	0.0080	1.743E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-09	0.0008
Total	1.079E-06	0.8528	3.117E-08	0.0246	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-07	0.1226

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.183E-08	0.0331
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.911E-08	0.0467
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.537E-08	0.0122
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.495E-07	0.3554
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.361E-09	0.0074
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.335E-09	0.0050
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.010E-07	0.4751
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.782E-08	0.0536
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.037E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.211E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-08	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.915E-04	0.000E+00	0.000E+00	0.000E+00	2.202E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.202E-01
Pa-231	3.833E-04	0.000E+00	0.000E+00	0.000E+00	4.408E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.408E-01
Pb-210	2.208E-04	0.000E+00	0.000E+00	0.000E+00	2.539E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.539E-01
Ra-226	2.048E-04	0.000E+00	0.000E+00	0.000E+00	2.355E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.355E-01
Ra-228	1.195E-05	0.000E+00	0.000E+00	0.000E+00	1.374E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.374E-02
Th-228	2.285E-05	0.000E+00	0.000E+00	0.000E+00	2.628E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.628E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.286E-04	0.000E+00	0.000E+00	0.000E+00	3.778E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.778E-01
U-235	1.424E-05	0.000E+00	0.000E+00	0.000E+00	1.637E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.637E-02
U-238	3.286E-04	0.000E+00	0.000E+00	0.000E+00	3.778E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.778E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.933E-08	0.0618	8.884E-10	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.132E-09	0.0024
Pa-231	1.251E-08	0.0098	6.403E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.180E-09	0.0017
Pb-210	3.342E-10	0.0003	2.014E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.587E-08	0.0202
Ra-226	9.018E-07	0.7028	2.689E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.643E-09	0.0044
Ra-228	2.985E-08	0.0233	2.841E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.066E-09	0.0008
Th-228	5.256E-08	0.0410	9.326E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.140E-10	0.0002
Th-230	8.386E-09	0.0065	2.860E-08	0.0223	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.150E-07	0.0896
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.286E-10	0.0001
U-234	2.224E-11	0.0000	2.004E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.906E-10	0.0006
U-235	2.119E-09	0.0017	7.807E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.502E-11	0.0000
U-238	9.878E-09	0.0077	1.705E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.982E-10	0.0008
Total	1.097E-06	0.8548	3.113E-08	0.0243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-07	0.1209

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.335E-08	0.0650
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.533E-08	0.0120
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.640E-08	0.0206
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.077E-07	0.7075
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.095E-08	0.0241
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.297E-08	0.0413
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-07	0.1184
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E-08	0.0086
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.650E-08	0.0284	4.087E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.441E-09	0.0011
Pa-231	5.535E-08	0.0431	1.120E-09	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.872E-09	0.0030
Pb-210	1.866E-10	0.0001	1.124E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-08	0.0113
Ra-226	4.332E-07	0.3377	1.803E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.281E-09	0.0072
Ra-228	8.662E-09	0.0068	1.297E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E-10	0.0001
Th-228	4.374E-09	0.0034	7.759E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.613E-11	0.0000
Th-230	4.771E-07	0.3718	2.878E-08	0.0224	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.227E-07	0.0957
Th-232	6.938E-08	0.0541	1.373E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.344E-09	0.0010
U-234	2.272E-11	0.0000	2.004E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.908E-10	0.0006
U-235	2.120E-09	0.0017	7.818E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.505E-11	0.0000
U-238	9.878E-09	0.0077	1.705E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.982E-10	0.0008
Total	1.097E-06	0.8548	3.113E-08	0.0243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-07	0.1209

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.835E-08	0.0299
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.034E-08	0.0470
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.474E-08	0.0115
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.427E-07	0.3450
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.813E-09	0.0069
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.408E-09	0.0034
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.286E-07	0.4899
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.086E-08	0.0552
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.014E-09	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E-08	0.0086
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.829E-04	0.000E+00	0.000E+00	0.000E+00	2.103E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.103E-01
Pa-231	3.667E-04	0.000E+00	0.000E+00	0.000E+00	4.217E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.217E-01
Pb-210	2.157E-04	0.000E+00	0.000E+00	0.000E+00	2.480E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.480E-01
Ra-226	2.221E-04	0.000E+00	0.000E+00	0.000E+00	2.554E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.554E-01
Ra-228	1.500E-05	0.000E+00	0.000E+00	0.000E+00	1.725E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.725E-02
Th-228	1.814E-05	0.000E+00	0.000E+00	0.000E+00	2.086E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.086E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	3.219E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.219E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.219E-02
U-234	3.143E-04	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01
U-235	1.362E-05	0.000E+00	0.000E+00	0.000E+00	1.566E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.566E-02
U-238	3.143E-04	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.583E-08	0.0575	8.492E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.994E-09	0.0023
Pa-231	1.197E-08	0.0091	6.125E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.086E-09	0.0016
Pb-210	3.369E-10	0.0003	2.031E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.607E-08	0.0198
Ra-226	9.406E-07	0.7130	2.805E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.886E-09	0.0045
Ra-228	3.086E-08	0.0234	2.937E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-09	0.0008
Th-228	5.327E-08	0.0404	9.453E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.183E-10	0.0002
Th-230	8.385E-09	0.0064	2.860E-08	0.0217	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.150E-07	0.0871
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.286E-10	0.0001
U-234	2.127E-11	0.0000	1.917E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.564E-10	0.0006
U-235	2.027E-09	0.0015	7.469E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.350E-11	0.0000
U-238	9.450E-09	0.0072	1.631E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.549E-10	0.0007
Total	1.133E-06	0.8587	3.106E-08	0.0235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E-07	0.1177

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.967E-08	0.0604
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.467E-08	0.0111
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.661E-08	0.0202
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.468E-07	0.7177
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.199E-08	0.0243
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.369E-08	0.0407
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-07	0.1152
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.694E-10	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.068E-09	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-08	0.0080
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.068E-08	0.0233	3.436E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-09	0.0009
Pa-231	5.712E-08	0.0433	1.118E-09	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.869E-09	0.0029
Pb-210	1.714E-10	0.0001	1.033E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.327E-08	0.0101
Ra-226	4.194E-07	0.3179	1.804E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.728E-09	0.0074
Ra-228	7.293E-09	0.0055	1.111E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-10	0.0001
Th-228	2.118E-09	0.0016	3.757E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-11	0.0000
Th-230	5.298E-07	0.4016	2.880E-08	0.0218	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.239E-07	0.0939
Th-232	7.473E-08	0.0567	1.454E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.427E-09	0.0011
U-234	2.184E-11	0.0000	1.918E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.565E-10	0.0006
U-235	2.028E-09	0.0015	7.482E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.354E-11	0.0000
U-238	9.450E-09	0.0072	1.631E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.550E-10	0.0007
Total	1.133E-06	0.8587	3.106E-08	0.0235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E-07	0.1177

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.224E-08	0.0244
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.211E-08	0.0471
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-08	0.0103
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.293E-07	0.3254
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.414E-09	0.0056
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.134E-09	0.0016
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.825E-07	0.5174
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.630E-08	0.0578
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.701E-10	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.069E-09	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-08	0.0080
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.559E-04	0.000E+00	0.000E+00	0.000E+00	1.792E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.792E-01
Pa-231	3.140E-04	0.000E+00	0.000E+00	0.000E+00	3.611E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.611E-01
Pb-210	2.081E-04	0.000E+00	0.000E+00	0.000E+00	2.393E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.393E-01
Ra-226	2.785E-04	0.000E+00	0.000E+00	0.000E+00	3.202E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.202E-01
Ra-228	2.099E-05	0.000E+00	0.000E+00	0.000E+00	2.414E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.414E-02
Th-228	1.944E-05	0.000E+00	0.000E+00	0.000E+00	2.236E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.236E-02
Th-230	2.798E-02	0.000E+00	0.000E+00	0.000E+00	3.218E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.218E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	3.218E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.218E-02
U-234	2.692E-04	0.000E+00	0.000E+00	0.000E+00	3.096E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.096E-01
U-235	1.167E-05	0.000E+00	0.000E+00	0.000E+00	1.342E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E-02
U-238	2.692E-04	0.000E+00	0.000E+00	0.000E+00	3.096E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.096E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.479E-08	0.0451	7.256E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.558E-09	0.0018
Pa-231	1.025E-08	0.0071	5.246E-10	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.786E-09	0.0012
Pb-210	3.536E-10	0.0002	2.131E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.737E-08	0.0190
Ra-226	1.067E-06	0.7421	3.182E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.677E-09	0.0046
Ra-228	3.284E-08	0.0228	3.125E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-09	0.0008
Th-228	5.703E-08	0.0397	1.012E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.408E-10	0.0002
Th-230	8.384E-09	0.0058	2.859E-08	0.0199	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-07	0.0799
Th-232	3.670E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.286E-10	0.0001
U-234	1.822E-11	0.0000	1.642E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.479E-10	0.0005
U-235	1.736E-09	0.0012	6.397E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.869E-11	0.0000
U-238	8.094E-09	0.0056	1.397E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.179E-10	0.0006
Total	1.250E-06	0.8697	3.085E-08	0.0215	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.565E-07	0.1088

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.808E-08	0.0474
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.256E-08	0.0087
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.793E-08	0.0194
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.074E-06	0.7469
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.405E-08	0.0237
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.747E-08	0.0400
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-07	0.1057
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.303E-10	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-09	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.052E-09	0.0063
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.438E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.671E-08	0.0116	1.871E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.597E-10	0.0005
Pa-231	5.834E-08	0.0406	1.063E-09	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.685E-09	0.0026
Pb-210	1.275E-10	0.0001	7.683E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.866E-09	0.0069
Ra-226	3.742E-07	0.2603	1.771E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-08	0.0075
Ra-228	3.181E-09	0.0022	4.942E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.439E-11	0.0000
Th-228	1.673E-10	0.0001	2.968E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.994E-13	0.0000
Th-230	7.013E-07	0.4878	2.887E-08	0.0201	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-07	0.0893
Th-232	8.653E-08	0.0602	1.636E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-09	0.0011
U-234	1.915E-11	0.0000	1.643E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.481E-10	0.0005
U-235	1.737E-09	0.0012	6.414E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.875E-11	0.0000
U-238	8.094E-09	0.0056	1.397E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.180E-10	0.0006
Total	1.250E-06	0.8697	3.085E-08	0.0215	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.565E-07	0.1088

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.756E-08	0.0122
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.308E-08	0.0439
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-08	0.0070
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.852E-07	0.2679
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.230E-09	0.0022
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-10	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.585E-07	0.5971
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.829E-08	0.0614
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.315E-10	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-09	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.052E-09	0.0063
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.438E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	9.951E-05	0.000E+00	0.000E+00	0.000E+00	1.144E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.144E-01
Pa-231	2.017E-04	0.000E+00	0.000E+00	0.000E+00	2.319E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.319E-01
Pb-210	2.392E-04	0.000E+00	0.000E+00	0.000E+00	2.750E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.750E-01
Ra-226	4.081E-04	0.000E+00	0.000E+00	0.000E+00	4.693E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.693E-01
Ra-228	2.449E-05	0.000E+00	0.000E+00	0.000E+00	2.816E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.816E-02
Th-228	2.434E-05	0.000E+00	0.000E+00	0.000E+00	2.799E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.799E-02
Th-230	2.797E-02	0.000E+00	0.000E+00	0.000E+00	3.216E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.216E+01
Th-232	2.798E-05	0.000E+00	0.000E+00	0.000E+00	3.217E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.217E-02
U-234	1.730E-04	0.000E+00	0.000E+00	0.000E+00	1.989E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.989E-01
U-235	7.495E-06	0.000E+00	0.000E+00	0.000E+00	8.618E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.618E-03
U-238	1.730E-04	0.000E+00	0.000E+00	0.000E+00	1.989E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.989E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.149E-08	0.0243	4.646E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.638E-09	0.0010
Pa-231	6.583E-09	0.0039	3.368E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.147E-09	0.0007
Pb-210	4.343E-10	0.0003	2.617E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.361E-08	0.0197
Ra-226	1.357E-06	0.7949	4.050E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.498E-09	0.0050
Ra-228	3.398E-08	0.0199	3.235E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.214E-09	0.0007
Th-228	6.012E-08	0.0352	1.067E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-10	0.0002
Th-230	8.379E-09	0.0049	2.858E-08	0.0167	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-07	0.0673
Th-232	3.669E-12	0.0000	3.632E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-10	0.0001
U-234	1.170E-11	0.0000	1.055E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.162E-10	0.0002
U-235	1.116E-09	0.0007	4.110E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.843E-11	0.0000
U-238	5.199E-09	0.0030	8.975E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.254E-10	0.0003
Total	1.515E-06	0.8871	3.042E-08	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.624E-07	0.0951

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.359E-08	0.0255
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.067E-09	0.0047
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.430E-08	0.0201
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-06	0.8002
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.523E-08	0.0206
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.058E-08	0.0355
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.518E-07	0.0889
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.334E-10	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.138E-09	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.814E-09	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.708E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.944E-09	0.0017	3.297E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.163E-10	0.0001
Pa-231	4.513E-08	0.0264	7.684E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.669E-09	0.0016
Pb-210	5.470E-11	0.0000	3.296E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.233E-09	0.0025
Ra-226	2.703E-07	0.1583	1.516E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-08	0.0063
Ra-228	2.141E-10	0.0001	3.342E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.940E-12	0.0000
Th-228	1.185E-13	0.0000	2.103E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.080E-16	0.0000
Th-230	1.096E-06	0.6418	2.906E-08	0.0170	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.419E-07	0.0831
Th-232	9.389E-08	0.0550	1.751E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-09	0.0010
U-234	1.395E-11	0.0000	1.056E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.165E-10	0.0002
U-235	1.117E-09	0.0007	4.132E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.851E-11	0.0000
U-238	5.199E-09	0.0030	8.977E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.255E-10	0.0003
Total	1.515E-06	0.8871	3.042E-08	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.624E-07	0.0951

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.094E-09	0.0018
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.856E-08	0.0284
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-09	0.0025
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.812E-07	0.1647
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.174E-10	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-13	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.267E-06	0.7419
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.576E-08	0.0561
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.360E-10	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.139E-09	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.814E-09	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.708E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.107E-05	0.000E+00	0.000E+00	0.000E+00	2.423E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.423E-02
Pa-231	4.279E-05	0.000E+00	0.000E+00	0.000E+00	4.920E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.920E-02
Pb-210	4.251E-04	0.000E+00	0.000E+00	0.000E+00	4.888E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.888E-01
Ra-226	6.367E-04	0.000E+00	0.000E+00	0.000E+00	7.321E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.321E-01
Ra-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	2.840E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.840E-02
Th-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	2.840E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.840E-02
Th-230	2.792E-02	0.000E+00	0.000E+00	0.000E+00	3.210E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.210E+01
Th-232	2.794E-05	0.000E+00	0.000E+00	0.000E+00	3.213E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.213E-02
U-234	3.675E-05	0.000E+00	0.000E+00	0.000E+00	4.226E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.226E-02
U-235	1.592E-06	0.000E+00	0.000E+00	0.000E+00	1.831E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.831E-03
U-238	3.675E-05	0.000E+00	0.000E+00	0.000E+00	4.226E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.226E-02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.792E-09	0.0040	9.847E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.472E-10	0.0002
Pa-231	1.397E-09	0.0006	7.147E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.434E-10	0.0001
Pb-210	6.904E-10	0.0003	4.160E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.342E-08	0.0243
Ra-226	1.867E-06	0.8510	5.579E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.171E-08	0.0053
Ra-228	3.398E-08	0.0155	3.238E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-09	0.0006
Th-228	6.016E-08	0.0274	1.070E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.603E-10	0.0002
Th-230	8.364E-09	0.0038	2.852E-08	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.146E-07	0.0522
Th-232	3.664E-12	0.0000	3.628E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-10	0.0001
U-234	2.487E-12	0.0000	2.241E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.843E-11	0.0000
U-235	2.371E-10	0.0001	8.732E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.916E-12	0.0000
U-238	1.104E-09	0.0005	1.907E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-10	0.0001
Total	1.982E-06	0.9033	2.988E-08	0.0136	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E-07	0.0831

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.238E-09	0.0042
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.712E-09	0.0008
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.452E-08	0.0248
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.880E-06	0.8566
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.523E-08	0.0161
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.063E-08	0.0276
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.515E-07	0.0691
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.683E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.133E-10	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.418E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-09	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.194E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.761E-12	0.0000	7.573E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.670E-13	0.0000
Pa-231	1.018E-08	0.0046	1.698E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.902E-10	0.0003
Pb-210	2.830E-12	0.0000	1.705E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.190E-10	0.0001
Ra-226	8.652E-08	0.0394	5.786E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.654E-09	0.0021
Ra-228	1.529E-14	0.0000	2.390E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-16	0.0000
Th-228	1.119E-24	0.0000	1.988E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.699E-27	0.0000
Th-230	1.790E-06	0.8157	2.943E-08	0.0134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.749E-07	0.0797
Th-232	9.415E-08	0.0429	1.757E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.704E-09	0.0008
U-234	9.204E-12	0.0000	2.254E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.913E-11	0.0000
U-235	2.379E-10	0.0001	8.872E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.965E-12	0.0000
U-238	1.104E-09	0.0005	1.908E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-10	0.0001
Total	1.982E-06	0.9033	2.988E-08	0.0136	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E-07	0.0831

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.104E-12	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-08	0.0050
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.235E-10	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.123E-08	0.0416
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.552E-14	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-24	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-06	0.9088
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.603E-08	0.0438
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-10	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.427E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-09	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.194E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.511E-07	0.000E+00	0.000E+00	0.000E+00	2.888E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.888E-04
Pa-231	5.100E-07	0.000E+00	0.000E+00	0.000E+00	5.864E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.864E-04
Pb-210	5.421E-04	0.000E+00	0.000E+00	0.000E+00	6.234E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.234E-01
Ra-226	7.368E-04	0.000E+00	0.000E+00	0.000E+00	8.472E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.472E-01
Ra-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	2.830E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.830E-02
Th-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	2.830E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.830E-02
Th-230	2.776E-02	0.000E+00	0.000E+00	0.000E+00	3.192E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.192E+01
Th-232	2.784E-05	0.000E+00	0.000E+00	0.000E+00	3.201E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.201E-02
U-234	4.398E-07	0.000E+00	0.000E+00	0.000E+00	5.057E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.057E-04
U-235	1.906E-08	0.000E+00	0.000E+00	0.000E+00	2.192E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.192E-05
U-238	4.398E-07	0.000E+00	0.000E+00	0.000E+00	5.057E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.057E-04

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.047E-10	0.0000	1.174E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.138E-12	0.0000
Pa-231	1.664E-11	0.0000	8.519E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.901E-12	0.0000
Pb-210	8.337E-10	0.0003	5.021E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.447E-08	0.0268
Ra-226	2.081E-06	0.8647	6.243E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-08	0.0054
Ra-228	3.375E-08	0.0140	3.226E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-09	0.0005
Th-228	5.961E-08	0.0248	1.066E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.590E-10	0.0001
Th-230	8.320E-09	0.0035	2.836E-08	0.0118	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-07	0.0474
Th-232	3.650E-12	0.0000	3.614E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-10	0.0001
U-234	2.976E-14	0.0000	2.682E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.058E-12	0.0000
U-235	2.838E-12	0.0000	1.045E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.687E-14	0.0000
U-238	1.318E-11	0.0000	2.282E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-12	0.0000
Total	2.184E-06	0.9074	2.967E-08	0.0123	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-07	0.0803

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.100E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.040E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.581E-08	0.0273
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.095E-06	0.8704
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.499E-08	0.0145
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.007E-08	0.0250
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.507E-07	0.0626
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.677E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.356E-12	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.895E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.475E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0
Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.950E-19	0.0000	2.185E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.705E-21	0.0000
Pa-231	1.213E-10	0.0001	2.025E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.037E-12	0.0000
Pb-210	5.984E-16	0.0000	3.604E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.627E-14	0.0000
Ra-226	3.336E-09	0.0014	2.309E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-10	0.0001
Ra-228	2.173E-26	0.0000	2.186E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.907E-28	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.087E-06	0.8671	2.949E-08	0.0123	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.914E-07	0.0795
Th-232	9.336E-08	0.0388	1.750E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.698E-09	0.0007
U-234	1.030E-11	0.0000	4.150E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.004E-12	0.0000
U-235	2.866E-12	0.0000	1.094E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.856E-14	0.0000
U-238	1.319E-11	0.0000	2.285E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-12	0.0000
Total	2.184E-06	0.9074	2.967E-08	0.0123	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-07	0.0803

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.049E-19	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.304E-10	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.723E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.527E-09	0.0015
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.205E-26	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.308E-06	0.9589
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.523E-08	0.0396
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.272E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.926E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.475E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	4.643E-14	0.000E+00	0.000E+00	0.000E+00	5.339E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.339E-11
Pa-231	9.429E-14	0.000E+00	0.000E+00	0.000E+00	1.084E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.084E-10
Pb-210	5.367E-04	0.000E+00	0.000E+00	0.000E+00	6.171E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.171E-01
Ra-226	7.268E-04	0.000E+00	0.000E+00	0.000E+00	8.357E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.357E-01
Ra-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	2.794E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.794E-02
Th-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	2.794E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.794E-02
Th-230	2.723E-02	0.000E+00	0.000E+00	0.000E+00	3.131E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.131E+01
Th-232	2.748E-05	0.000E+00	0.000E+00	0.000E+00	3.160E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.160E-02
U-234	8.248E-14	0.000E+00	0.000E+00	0.000E+00	9.485E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.485E-11
U-235	3.574E-15	0.000E+00	0.000E+00	0.000E+00	4.110E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.110E-12
U-238	8.248E-14	0.000E+00	0.000E+00	0.000E+00	9.485E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.485E-11

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.927E-17	0.0000	2.170E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.651E-19	0.0000
Pa-231	3.064E-18	0.0000	1.575E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.364E-19	0.0000
Pb-210	8.243E-10	0.0004	4.961E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.370E-08	0.0274
Ra-226	2.008E-06	0.8632	6.150E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.290E-08	0.0055
Ra-228	3.274E-08	0.0141	3.185E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-09	0.0005
Th-228	5.728E-08	0.0246	1.052E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.544E-10	0.0002
Th-230	8.162E-09	0.0035	2.782E-08	0.0120	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.118E-07	0.0481
Th-232	3.603E-12	0.0000	3.568E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.262E-10	0.0001
U-234	5.580E-21	0.0000	5.031E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.985E-19	0.0000
U-235	5.318E-19	0.0000	1.960E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.790E-21	0.0000
U-238	2.444E-18	0.0000	4.280E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.506E-19	0.0000
Total	2.107E-06	0.9058	2.910E-08	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.901E-07	0.0817

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.025E-17	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.758E-18	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.502E-08	0.0279
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.022E-06	0.8690
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.397E-08	0.0146
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-08	0.0248
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.478E-07	0.0635
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.655E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.544E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.426E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.737E-18	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.231E-17	0.0000	3.742E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-18	0.0000
Pb-210	8.218E-29	0.0000	4.517E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.350E-27	0.0000
Ra-226	3.730E-14	0.0000	2.636E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.158E-15	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.017E-06	0.8671	2.893E-08	0.0124	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-07	0.0810
Th-232	9.003E-08	0.0387	1.728E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.676E-09	0.0007
U-234	1.007E-11	0.0000	1.444E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.407E-13	0.0000
U-235	5.495E-19	0.0000	2.258E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.828E-21	0.0000
U-238	1.289E-15	0.0000	1.849E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-16	0.0000
Total	2.107E-06	0.9058	2.910E-08	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.901E-07	0.0817

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.399E-17	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.477E-27	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.948E-14	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.234E-06	0.9605
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.188E-08	0.0395
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.616E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-15	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

DCFPAK 3.02 (Infant) – Dose

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: DCFPAK3.02)	2.615E-04	2.615E-04	DCF1(1)
A-1	Ac-228 (Source: DCFPAK3.02)	5.044E+00	5.044E+00	DCF1(2)
A-1	At-218 (Source: DCFPAK3.02)	5.567E-05	5.567E-05	DCF1(3)
A-1	At-219 (Source: DCFPAK3.02)	0.000E+00	0.000E+00	DCF1(4)
A-1	Bi-210 (Source: DCFPAK3.02)	5.473E-03	5.474E-03	DCF1(5)
A-1	Bi-211 (Source: DCFPAK3.02)	2.410E-01	2.410E-01	DCF1(6)
A-1	Bi-212 (Source: DCFPAK3.02)	6.258E-01	6.259E-01	DCF1(7)
A-1	Bi-214 (Source: DCFPAK3.02)	9.135E+00	9.136E+00	DCF1(8)
A-1	Bi-215 (Source: DCFPAK3.02)	1.369E+00	1.369E+00	DCF1(9)
A-1	Fr-223 (Source: DCFPAK3.02)	1.758E-01	1.758E-01	DCF1(10)
A-1	Hg-206 (Source: DCFPAK3.02)	6.127E-01	6.128E-01	DCF1(11)
A-1	Pa-231 (Source: DCFPAK3.02)	1.608E-01	1.609E-01	DCF1(12)
A-1	Pa-234 (Source: DCFPAK3.02)	8.275E+00	8.276E+00	DCF1(13)
A-1	Pa-234m (Source: DCFPAK3.02)	1.257E-01	1.257E-01	DCF1(14)
A-1	Pb-210 (Source: DCFPAK3.02)	2.092E-03	2.092E-03	DCF1(15)
A-1	Pb-211 (Source: DCFPAK3.02)	3.680E-01	3.680E-01	DCF1(16)
A-1	Pb-212 (Source: DCFPAK3.02)	6.314E-01	6.315E-01	DCF1(17)
A-1	Pb-214 (Source: DCFPAK3.02)	1.257E+00	1.257E+00	DCF1(18)
A-1	Po-210 (Source: DCFPAK3.02)	5.641E-05	5.642E-05	DCF1(19)
A-1	Po-211 (Source: DCFPAK3.02)	4.707E-02	4.708E-02	DCF1(20)
A-1	Po-212 (Source: DCFPAK3.02)	0.000E+00	0.000E+00	DCF1(21)
A-1	Po-214 (Source: DCFPAK3.02)	4.801E-04	4.801E-04	DCF1(22)
A-1	Po-215 (Source: DCFPAK3.02)	9.452E-04	9.453E-04	DCF1(23)
A-1	Po-216 (Source: DCFPAK3.02)	8.873E-05	8.874E-05	DCF1(24)
A-1	Po-218 (Source: DCFPAK3.02)	9.228E-09	9.229E-09	DCF1(25)
A-1	Ra-223 (Source: DCFPAK3.02)	5.791E-01	5.791E-01	DCF1(26)
A-1	Ra-224 (Source: DCFPAK3.02)	4.950E-02	4.951E-02	DCF1(27)
A-1	Ra-226 (Source: DCFPAK3.02)	3.176E-02	3.176E-02	DCF1(28)
A-1	Ra-228 (Source: DCFPAK3.02)	6.575E-05	6.576E-05	DCF1(29)
A-1	Rn-218 (Source: DCFPAK3.02)	4.259E-03	4.260E-03	DCF1(30)
A-1	Rn-219 (Source: DCFPAK3.02)	2.970E-01	2.970E-01	DCF1(31)
A-1	Rn-220 (Source: DCFPAK3.02)	3.474E-03	3.475E-03	DCF1(32)
A-1	Rn-222 (Source: DCFPAK3.02)	2.130E-03	2.130E-03	DCF1(33)
A-1	Th-227 (Source: DCFPAK3.02)	5.641E-01	5.642E-01	DCF1(34)
A-1	Th-228 (Source: DCFPAK3.02)	7.248E-03	7.249E-03	DCF1(35)
A-1	Th-230 (Source: DCFPAK3.02)	1.106E-03	1.106E-03	DCF1(36)
A-1	Th-231 (Source: DCFPAK3.02)	3.250E-02	3.251E-02	DCF1(37)
A-1	Th-232 (Source: DCFPAK3.02)	4.782E-04	4.783E-04	DCF1(38)
A-1	Th-234 (Source: DCFPAK3.02)	2.316E-02	2.317E-02	DCF1(39)
A-1	Tl-206 (Source: DCFPAK3.02)	1.278E-02	1.278E-02	DCF1(40)
A-1	Tl-207 (Source: DCFPAK3.02)	2.391E-02	2.391E-02	DCF1(41)
A-1	Tl-208 (Source: DCFPAK3.02)	2.167E+01	2.167E+01	DCF1(42)
A-1	Tl-210 (Source: DCFPAK3.02)	1.677E+01	1.678E+01	DCF1(43)
A-1	U-234 (Source: DCFPAK3.02)	3.456E-04	3.456E-04	DCF1(44)
A-1	U-235 (Source: DCFPAK3.02)	7.005E-01	7.006E-01	DCF1(45)
A-1	U-238 (Source: DCFPAK3.02)	1.713E-04	1.713E-04	DCF1(46)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	1.619E+00	1.360E+00	DCF2(1)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Ac-227+D1	1.619E+00	1.360E+00	DCF2(2)
B-1	Ac-227+D2	1.477E+00	1.360E+00	DCF2(3)
B-1	Ac-227+D3	1.477E+00	1.360E+00	DCF2(4)
B-1	Ac-227+D4	1.360E+00	1.360E+00	DCF2(5)
B-1	Ac-227+D5	1.360E+00	1.360E+00	DCF2(6)
B-1	Pa-231	1.536E+00	1.536E+00	DCF2(7)
B-1	Pb-210+D	1.357E-01	6.759E-02	DCF2(13)
B-1	Pb-210+D1	1.357E-01	6.759E-02	DCF2(14)
B-1	Pb-210+D2	6.966E-02	6.759E-02	DCF2(15)
B-1	Pb-210+D3	6.759E-02	6.759E-02	DCF2(16)
B-1	Ra-226+D	1.245E-01	1.239E-01	DCF2(17)
B-1	Ra-226+D1	1.245E-01	1.239E-01	DCF2(20)
B-1	Ra-226+D2	1.242E-01	1.239E-01	DCF2(23)
B-1	Ra-226+D3	1.242E-01	1.239E-01	DCF2(26)
B-1	Ra-226+D4	1.239E-01	1.239E-01	DCF2(29)
B-1	Ra-228+D	1.789E-01	1.787E-01	DCF2(32)
B-1	Th-228+D	7.039E-01	6.552E-01	DCF2(33)
B-1	Th-230	7.666E-01	7.666E-01	DCF2(34)
B-1	Th-232	8.594E-01	8.594E-01	DCF2(49)
B-1	U-234	1.225E-01	1.225E-01	DCF2(50)
B-1	U-235+D	1.112E-01	1.112E-01	DCF2(65)
B-1	U-238	1.054E-01	1.054E-01	DCF2(71)
B-1	U-238+D	1.056E-01	1.054E-01	DCF2(72)
B-1	U-238+D1	1.056E-01	1.054E-01	DCF2(87)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.749E-02	2.690E-02	DCF3(1)
D-1	Ac-227+D1	4.749E-02	2.690E-02	DCF3(2)
D-1	Ac-227+D2	4.647E-02	2.690E-02	DCF3(3)
D-1	Ac-227+D3	4.647E-02	2.690E-02	DCF3(4)
D-1	Ac-227+D4	2.701E-02	2.690E-02	DCF3(5)
D-1	Ac-227+D5	2.701E-02	2.690E-02	DCF3(6)
D-1	Pa-231	3.053E-02	3.053E-02	DCF3(7)
D-1	Pb-210+D	1.274E-01	3.082E-02	DCF3(13)
D-1	Pb-210+D1	1.274E-01	3.082E-02	DCF3(14)
D-1	Pb-210+D2	3.088E-02	3.082E-02	DCF3(15)
D-1	Pb-210+D3	3.082E-02	3.082E-02	DCF3(16)
D-1	Ra-226+D	1.722E-02	1.720E-02	DCF3(17)
D-1	Ra-226+D1	1.722E-02	1.720E-02	DCF3(20)
D-1	Ra-226+D2	1.721E-02	1.720E-02	DCF3(23)
D-1	Ra-226+D3	1.721E-02	1.720E-02	DCF3(26)
D-1	Ra-226+D4	1.720E-02	1.720E-02	DCF3(29)
D-1	Ra-228+D	1.088E-01	1.088E-01	DCF3(32)
D-1	Th-228+D	2.426E-02	1.369E-02	DCF3(33)
D-1	Th-230	1.532E-02	1.532E-02	DCF3(34)
D-1	Th-232	1.713E-02	1.713E-02	DCF3(49)
D-1	U-234	1.365E-03	1.365E-03	DCF3(50)
D-1	U-235+D	1.317E-03	1.302E-03	DCF3(65)
D-1	U-238	1.240E-03	1.240E-03	DCF3(71)
D-1	U-238+D	1.402E-03	1.240E-03	DCF3(72)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-238+D1	1.387E-03	1.240E-03	DCF3(87)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Ac-227+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(2,1)
D-34	Ac-227+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,2)
D-34	Ac-227+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(2,3)
D-34				
D-34	Ac-227+D2 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(3,1)
D-34	Ac-227+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,2)
D-34	Ac-227+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,3)
D-34				
D-34	Ac-227+D3 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(4,1)
D-34	Ac-227+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,2)
D-34	Ac-227+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(4,3)
D-34				
D-34	Ac-227+D4 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Ac-227+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,2)
D-34	Ac-227+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)
D-34				
D-34	Ac-227+D5 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	Ac-227+D5 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,2)
D-34	Ac-227+D5 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(13,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(13,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(13,3)
D-34				
D-34	Pb-210+D1 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(14,1)
D-34	Pb-210+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(14,2)
D-34	Pb-210+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(14,3)
D-34				
D-34	Pb-210+D2 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(15,1)
D-34	Pb-210+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(15,2)
D-34	Pb-210+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(15,3)
D-34				
D-34	Pb-210+D3 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(16,1)
D-34	Pb-210+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(16,2)
D-34	Pb-210+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(16,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(17,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(17,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Ra-226+D1 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(20,1)
D-34	Ra-226+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,2)
D-34	Ra-226+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(20,3)
D-34				
D-34	Ra-226+D2 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(23,1)
D-34	Ra-226+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,2)
D-34	Ra-226+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(23,3)
D-34				
D-34	Ra-226+D3 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(26,1)
D-34	Ra-226+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,2)
D-34	Ra-226+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(26,3)
D-34				
D-34	Ra-226+D4 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(29,1)
D-34	Ra-226+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,2)
D-34	Ra-226+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(32,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(32,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(33,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(33,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(33,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(34,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(34,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(34,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(49,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(49,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(49,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(50,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(50,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(50,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(65,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(65,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(65,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(71,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(71,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(71,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(72,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(72,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(72,3)
D-34				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	U-238+D1 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(87,1)
D-34	U-238+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(87,2)
D-34	U-238+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(87,3)
D-34				
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Ac-227+D1 , fish	1.500E+01	1.500E+01	BIOFAC(2,1)
D-5	Ac-227+D1 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Ac-227+D2 , fish	1.500E+01	1.500E+01	BIOFAC(3,1)
D-5	Ac-227+D2 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5				
D-5	Ac-227+D3 , fish	1.500E+01	1.500E+01	BIOFAC(4,1)
D-5	Ac-227+D3 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5				
D-5	Ac-227+D4 , fish	1.500E+01	1.500E+01	BIOFAC(5,1)
D-5	Ac-227+D4 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)
D-5				
D-5	Ac-227+D5 , fish	1.500E+01	1.500E+01	BIOFAC(6,1)
D-5	Ac-227+D5 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(13,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(13,2)
D-5				
D-5	Pb-210+D1 , fish	3.000E+02	3.000E+02	BIOFAC(14,1)
D-5	Pb-210+D1 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(14,2)
D-5				
D-5	Pb-210+D2 , fish	3.000E+02	3.000E+02	BIOFAC(15,1)
D-5	Pb-210+D2 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(15,2)
D-5				
D-5	Pb-210+D3 , fish	3.000E+02	3.000E+02	BIOFAC(16,1)
D-5	Pb-210+D3 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(16,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(17,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(17,2)
D-5				
D-5	Ra-226+D1 , fish	5.000E+01	5.000E+01	BIOFAC(20,1)
D-5	Ra-226+D1 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(20,2)
D-5				
D-5	Ra-226+D2 , fish	5.000E+01	5.000E+01	BIOFAC(23,1)
D-5	Ra-226+D2 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(23,2)
D-5				
D-5	Ra-226+D3 , fish	5.000E+01	5.000E+01	BIOFAC(26,1)
D-5	Ra-226+D3 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(26,2)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: DCFPAK3.02 (Infant)

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D4 , fish	5.000E+01	5.000E+01	BIOFAC(29,1)
D-5	Ra-226+D4 , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(29,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(32,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(32,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(33,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(33,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(34,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(34,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(49,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(49,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(50,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(50,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(65,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(65,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(71,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(71,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(72,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(72,2)
D-5				
D-5	U-238+D1 , fish	1.000E+01	1.000E+01	BIOFAC(87,1)
D-5	U-238+D1 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(87,2)
D-5				

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	7.000E-03	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.400E-02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pb-210	8.000E-03	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): Ra-226	7.000E-03	0.000E+00	---	S1(17)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.600E-04	0.000E+00	---	S1(32)
R012	Initial principal radionuclide (pCi/g): Th-228	1.000E-03	0.000E+00	---	S1(33)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(34)
R012	Initial principal radionuclide (pCi/g): Th-232	1.000E-03	0.000E+00	---	S1(49)
R012	Initial principal radionuclide (pCi/g): U-234	1.200E-02	0.000E+00	---	S1(50)
R012	Initial principal radionuclide (pCi/g): U-235	5.200E-04	0.000E+00	---	S1(65)
R012	Initial principal radionuclide (pCi/g): U-238	1.200E-02	0.000E+00	---	S1(71)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(17)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(32)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(33)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(34)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(49)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(50)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(65)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(71)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.497E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.109E-02	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(32)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(32,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(32)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.582E-02	ALEACH(32)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(32)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(33)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(33,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(33)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(33)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(33)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(34)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(34,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(34)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(34)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(34)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(49)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(49,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(49)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.852E-05	ALEACH(49)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(49)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(50)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(50,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(50)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(50)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(50)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(65)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(65,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(65)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(65)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(65)

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(71)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(71,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(71)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.213E-02	ALEACH(71)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(71)
R017	Inhalation rate (m**3/yr)	4.836E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.550E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	7.990E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	2.190E+01	3.650E+01	---	SOIL

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

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Contaminated Zone Dimensions

Area:	10000.00 square meters
Thickness:	0.30 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	7.000E-03
Pa-231	1.400E-02
Pb-210	8.000E-03
Ra-226	7.000E-03
Ra-228	3.600E-04
Th-228	1.000E-03
Th-230	1.000E+00
Th-232	1.000E-03
U-234	1.200E-02
U-235	5.200E-04
U-238	1.200E-02

0
Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.347E-01	3.349E-01	3.358E-01	3.406E-01	3.546E-01	3.887E-01	4.059E-01	3.972E-01
M(t):	1.339E-02	1.340E-02	1.343E-02	1.363E-02	1.418E-02	1.555E-02	1.624E-02	1.589E-02

0Maximum TDOSE(t): 4.060E-01 mrem/yr at t = 304.1 ± 0.6 years
0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.041E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.564E-14	0.0000	1.046E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.766E-14	0.0000
Pa-231	6.356E-06	0.0000	1.075E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-05	0.0000
Pb-210	5.139E-11	0.0000	7.699E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.157E-08	0.0000
Ra-226	1.628E-04	0.0004	3.979E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-04	0.0003
Ra-228	2.016E-21	0.0000	1.209E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.851E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.674E-02	0.2137	2.144E-02	0.0528	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.914E-01	0.7177
Th-232	3.875E-03	0.0095	4.565E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.157E-03	0.0053
U-234	4.276E-07	0.0000	1.556E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-06	0.0000
U-235	1.504E-07	0.0000	2.170E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.640E-08	0.0000
U-238	7.406E-07	0.0000	4.202E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.175E-07	0.0000
Total	9.078E-02	0.2236	2.149E-02	0.0529	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.937E-01	0.7234

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.041E+02 years

0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.434E-14	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-05	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.170E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.986E-04	0.0007
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.813E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.995E-01	0.9842
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.078E-03	0.0150
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.343E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.690E-07	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.100E-06	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.060E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.541E-03	0.0136	3.036E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.123E-03	0.0153
Pa-231	8.765E-04	0.0026	6.051E-04	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.967E-03	0.0208
Pb-210	1.985E-05	0.0001	2.976E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.607E-02	0.0480
Ra-226	2.294E-02	0.0686	2.460E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-03	0.0064
Ra-228	6.974E-04	0.0021	2.778E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.109E-04	0.0018
Th-228	2.376E-03	0.0071	1.653E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.275E-04	0.0010
Th-230	1.078E-03	0.0032	2.146E-02	0.0641	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.466E-01	0.7368
Th-232	1.109E-04	0.0003	2.447E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.791E-04	0.0011
U-234	1.401E-06	0.0000	4.070E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.608E-04	0.0008
U-235	1.244E-04	0.0004	1.601E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-05	0.0000
U-238	6.206E-04	0.0019	3.507E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.649E-04	0.0008
Total	3.339E-02	0.0998	2.254E-02	0.0674	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.787E-01	0.8329

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0 Water Dependent Pathways

0 Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.967E-03	0.0298
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.448E-03	0.0252
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.612E-02	0.0482
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.511E-02	0.0750
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.311E-03	0.0039
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.720E-03	0.0081
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.691E-01	0.8041
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.145E-04	0.0015
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.029E-04	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.369E-04	0.0004
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.206E-04	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.347E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.163E-03	0.0124	2.783E-04	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.697E-03	0.0140
Pa-231	1.131E-03	0.0034	6.101E-04	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.123E-03	0.0213
Pb-210	1.902E-05	0.0001	2.852E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.540E-02	0.0460
Ra-226	2.257E-02	0.0674	2.500E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.536E-03	0.0076
Ra-228	8.506E-04	0.0025	4.108E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.664E-04	0.0017
Th-228	1.653E-03	0.0049	1.150E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.279E-04	0.0007
Th-230	2.486E-03	0.0074	2.146E-02	0.0641	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.467E-01	0.7368
Th-232	3.733E-04	0.0011	2.565E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.764E-04	0.0017
U-234	1.370E-06	0.0000	3.981E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.551E-04	0.0008
U-235	1.217E-04	0.0004	1.567E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-05	0.0000
U-238	6.070E-04	0.0018	3.430E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.591E-04	0.0008
Total	3.398E-02	0.1015	2.252E-02	0.0672	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.784E-01	0.8313

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.139E-03	0.0273
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.864E-03	0.0265
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.545E-02	0.0461
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.513E-02	0.0751
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.421E-03	0.0042
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-03	0.0057
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.707E-01	0.8083
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.754E-04	0.0029
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.963E-04	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.339E-04	0.0004
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.004E-04	0.0027
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.349E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.500E-03	0.0104	2.340E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.949E-03	0.0118
Pa-231	1.558E-03	0.0046	6.155E-04	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.351E-03	0.0219
Pb-210	1.748E-05	0.0001	2.621E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-02	0.0421
Ra-226	2.185E-02	0.0651	2.567E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.248E-03	0.0097
Ra-228	9.118E-04	0.0027	4.966E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.676E-04	0.0014
Th-228	8.005E-04	0.0024	5.568E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-04	0.0003
Th-230	5.235E-03	0.0156	2.146E-02	0.0639	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-01	0.7358
Th-232	9.766E-04	0.0029	2.878E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.228E-04	0.0027
U-234	1.312E-06	0.0000	3.809E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.441E-04	0.0007
U-235	1.164E-04	0.0003	1.500E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-05	0.0000
U-238	5.807E-04	0.0017	3.281E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.479E-04	0.0007
Total	3.555E-02	0.1059	2.248E-02	0.0669	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.778E-01	0.8272

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.682E-03	0.0229
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.524E-03	0.0284
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-02	0.0423
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.513E-02	0.0748
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E-03	0.0041
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.164E-04	0.0027
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.738E-01	0.8153
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-03	0.0057
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.835E-04	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-04	0.0004
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.614E-04	0.0026
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.358E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.906E-03	0.0056	1.274E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.151E-03	0.0063
Pa-231	2.409E-03	0.0071	5.989E-04	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.507E-03	0.0220
Pb-210	1.300E-05	0.0000	1.949E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-02	0.0309
Ra-226	1.950E-02	0.0573	2.700E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.107E-03	0.0150
Ra-228	4.923E-04	0.0014	2.895E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.995E-04	0.0006
Th-228	6.323E-05	0.0002	4.399E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.716E-06	0.0000
Th-230	1.418E-02	0.0416	2.147E-02	0.0630	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.489E-01	0.7306
Th-232	2.658E-03	0.0078	3.840E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.671E-03	0.0049
U-234	1.131E-06	0.0000	3.264E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.093E-04	0.0006
U-235	9.972E-05	0.0003	1.288E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.790E-06	0.0000
U-238	4.974E-04	0.0015	2.811E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.123E-04	0.0006
Total	4.182E-02	0.1228	2.235E-02	0.0656	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-01	0.8116

0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
0 Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.184E-03	0.0123
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E-02	0.0309
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-02	0.0310
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.464E-02	0.0723
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.947E-04	0.0020
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.238E-05	0.0002
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.845E-01	0.8353
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.367E-03	0.0128
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.430E-04	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.098E-04	0.0003
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.378E-04	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.406E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.358E-04	0.0009	2.245E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.789E-04	0.0011
Pa-231	2.421E-03	0.0068	4.431E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.807E-03	0.0164
Pb-210	5.578E-06	0.0000	8.362E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.515E-03	0.0127
Ra-226	1.409E-02	0.0397	2.550E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.927E-03	0.0195
Ra-228	3.453E-05	0.0001	2.057E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-05	0.0000
Th-228	4.477E-08	0.0000	3.117E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.175E-09	0.0000
Th-230	3.476E-02	0.0980	2.149E-02	0.0606	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.566E-01	0.7236
Th-232	3.835E-03	0.0108	4.537E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.135E-03	0.0060
U-234	7.723E-07	0.0000	2.100E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.349E-04	0.0004
U-235	6.409E-05	0.0002	8.338E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.732E-06	0.0000
U-238	3.195E-04	0.0009	1.806E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.364E-04	0.0004
Total	5.587E-02	0.1576	2.208E-02	0.0623	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.766E-01	0.7802

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.372E-04	0.0021
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.672E-03	0.0245
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.529E-03	0.0128
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-02	0.0593
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.811E-05	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.126E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.128E-01	0.8823
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.015E-03	0.0170
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-04	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.066E-05	0.0002
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.739E-04	0.0013
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.546E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.712E-07	0.0000	5.157E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.703E-07	0.0000
Pa-231	5.830E-04	0.0015	9.864E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-03	0.0034
Pb-210	2.886E-07	0.0000	4.326E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.336E-04	0.0006
Ra-226	4.510E-03	0.0116	1.053E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.492E-03	0.0090
Ra-228	2.467E-09	0.0000	1.472E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.560E-10	0.0000
Th-228	4.231E-19	0.0000	2.950E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.845E-20	0.0000
Th-230	7.102E-02	0.1827	2.153E-02	0.0554	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-01	0.7194
Th-232	3.909E-03	0.0101	4.582E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.165E-03	0.0056
U-234	4.018E-07	0.0000	4.547E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.972E-05	0.0001
U-235	1.365E-05	0.0000	1.825E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.289E-06	0.0000
U-238	6.784E-05	0.0002	3.837E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.899E-05	0.0001
Total	8.010E-02	0.2061	2.169E-02	0.0558	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.869E-01	0.7381

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Dependent Pathways

0 Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.693E-06	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.992E-03	0.0051
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.343E-04	0.0006
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.013E-03	0.0206
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.437E-09	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.845E-19	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.722E-01	0.9575
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.119E-03	0.0157
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.467E-05	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-05	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-04	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.887E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.225E-14	0.0000	1.488E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.512E-14	0.0000
Pa-231	6.953E-06	0.0000	1.176E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.563E-05	0.0000
Pb-210	6.102E-11	0.0000	9.142E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.936E-08	0.0000
Ra-226	1.739E-04	0.0004	4.250E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.446E-04	0.0004
Ra-228	3.506E-21	0.0000	2.102E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.671E-02	0.2136	2.145E-02	0.0528	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.914E-01	0.7177
Th-232	3.876E-03	0.0095	4.565E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.157E-03	0.0053
U-234	4.271E-07	0.0000	1.601E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.788E-06	0.0000
U-235	1.645E-07	0.0000	2.370E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.789E-08	0.0000
U-238	8.103E-07	0.0000	4.597E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.473E-07	0.0000
Total	9.077E-02	0.2236	2.149E-02	0.0529	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.937E-01	0.7235

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.885E-14	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.376E-05	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.952E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.190E-04	0.0008
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.893E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.995E-01	0.9842
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.079E-03	0.0150
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.376E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.848E-07	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-06	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.059E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.279E-12	0.0000	2.173E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.888E-12	0.0000
Pb-210	8.382E-24	0.0000	1.254E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.774E-21	0.0000
Ra-226	1.945E-09	0.0000	4.853E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.652E-09	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.396E-02	0.2114	2.104E-02	0.0530	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.863E-01	0.7208
Th-232	3.739E-03	0.0094	4.506E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.129E-03	0.0054
U-234	4.192E-07	0.0000	1.050E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.429E-06	0.0000
U-235	3.154E-14	0.0000	5.649E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.955E-15	0.0000
U-238	5.370E-11	0.0000	1.343E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.827E-10	0.0000
Total	8.770E-02	0.2208	2.108E-02	0.0531	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.884E-01	0.7261

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
0 Water Dependent Pathways

0 Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.384E-12	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.795E-21	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.601E-09	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.913E-01	0.9851
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.913E-03	0.0149
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.954E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.706E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.498E-10	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.972E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227+D	Ac-227+D	9.835E-01	1.402E+00	1.286E+00	1.081E+00	5.886E-01	1.037E-01	2.382E-04	6.873E-12	2.800E-38
0Ac-227+D1	Ac-227+D1	2.722E-03	3.900E-03	3.576E-03	3.006E-03	1.637E-03	2.885E-04	6.625E-07	1.911E-14	7.787E-41
0Ac-227+D2	Ac-227+D2	1.376E-02	1.767E-02	1.620E-02	1.362E-02	7.417E-03	1.307E-03	3.001E-06	8.659E-14	3.528E-40
0Ac-227+D3	Ac-227+D3	3.809E-05	4.917E-05	4.508E-05	3.789E-05	2.064E-05	3.637E-06	8.352E-09	2.410E-16	9.823E-43
0Ac-227+D4	Ac-227+D4	8.257E-07	9.331E-07	8.555E-07	7.192E-07	3.917E-07	6.901E-08	1.585E-10	4.569E-18	1.822E-44
0Ac-227+D5	Ac-227+D5	2.285E-09	2.599E-09	2.383E-09	2.003E-09	1.091E-09	1.922E-10	4.413E-13	1.272E-20	0.000E+00
0Pa-231	Pa-231	9.835E-01	5.710E-01	5.585E-01	5.343E-01	4.576E-01	2.938E-01	6.234E-02	7.429E-04	1.372E-10
Pa-231	Ac-227+D	9.835E-01	2.248E-02	6.427E-02	1.349E-01	2.815E-01	3.158E-01	7.771E-02	9.273E-04	1.710E-10
Pa-231	ΣDSR(j)		5.935E-01	6.228E-01	6.693E-01	7.390E-01	6.096E-01	1.400E-01	1.670E-03	3.082E-10
0Pa-231	Pa-231	2.722E-03	1.580E-03	1.546E-03	1.479E-03	1.266E-03	8.132E-04	1.725E-04	2.056E-06	3.798E-13
Pa-231	Ac-227+D1	2.722E-03	6.252E-05	1.788E-04	3.753E-04	7.828E-04	8.783E-04	2.161E-04	2.579E-06	4.754E-13
Pa-231	ΣDSR(j)		1.643E-03	1.725E-03	1.854E-03	2.049E-03	1.691E-03	3.887E-04	4.635E-06	8.552E-13
0Pa-231	Pa-231	1.376E-02	7.990E-03	7.815E-03	7.476E-03	6.403E-03	4.111E-03	8.722E-04	1.039E-05	1.920E-12
Pa-231	Ac-227+D2	1.376E-02	2.832E-04	8.098E-04	1.700E-03	3.546E-03	3.979E-03	9.791E-04	1.168E-05	2.154E-12
Pa-231	ΣDSR(j)		8.273E-03	8.625E-03	9.177E-03	9.949E-03	8.090E-03	1.851E-03	2.208E-05	4.074E-12
0Pa-231	Pa-231	3.809E-05	2.211E-05	2.163E-05	2.069E-05	1.772E-05	1.138E-05	2.414E-06	2.877E-08	5.314E-15
Pa-231	Ac-227+D3	3.809E-05	7.881E-07	2.253E-06	4.732E-06	9.869E-06	1.107E-05	2.725E-06	3.251E-08	5.993E-15
Pa-231	ΣDSR(j)		2.290E-05	2.388E-05	2.542E-05	2.759E-05	2.245E-05	5.139E-06	6.128E-08	1.131E-14
0Pa-231	Pa-231	8.257E-07	4.794E-07	4.689E-07	4.486E-07	3.842E-07	2.467E-07	5.234E-08	6.237E-10	1.152E-16
Pa-231	Ac-227+D4	8.257E-07	1.496E-08	4.277E-08	8.980E-08	1.873E-07	2.101E-07	5.169E-08	6.164E-10	1.132E-16
Pa-231	ΣDSR(j)		4.944E-07	5.117E-07	5.384E-07	5.715E-07	4.568E-07	1.040E-07	1.240E-09	2.284E-16
0Pa-231	Pa-231	2.285E-09	1.327E-09	1.298E-09	1.242E-09	1.063E-09	6.827E-10	1.449E-10	1.726E-12	3.189E-19
Pa-231	Ac-227+D5	2.285E-09	4.165E-11	1.191E-10	2.501E-10	5.216E-10	5.851E-10	1.440E-10	1.717E-12	3.153E-19
Pa-231	ΣDSR(j)		1.369E-09	1.417E-09	1.492E-09	1.585E-09	1.268E-09	2.888E-10	3.443E-12	6.341E-19
0Pb-210+D	Pb-210+D	1.000E+00	2.015E+00	1.931E+00	1.774E+00	1.320E+00	5.661E-01	2.929E-02	6.189E-06	8.493E-19
0Pb-210+D1	Pb-210+D1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D2	Pb-210+D2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Pb-210+D3	Pb-210+D3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Ra-226+D	Ra-226+D	9.996E-01	3.554E+00	3.496E+00	3.384E+00	3.020E+00	2.181E+00	6.980E-01	2.692E-02	3.016E-07
Ra-226+D	Pb-210+D1	9.996E-01	3.149E-02	9.204E-02	2.028E-01	4.972E-01	8.230E-01	4.460E-01	1.862E-02	2.126E-07
Ra-226+D	ΣDSR(j)		3.585E+00	3.588E+00	3.587E+00	3.517E+00	3.004E+00	1.144E+00	4.554E-02	5.142E-07

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 25
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D	Ra-226+D	1.319E-06	4.691E-06	4.615E-06	4.467E-06	3.986E-06	2.879E-06	9.214E-07	3.554E-08	3.981E-13
Ra-226+D	Pb-210+D2	1.319E-06	1.021E-08	2.986E-08	6.578E-08	1.613E-07	2.669E-07	1.447E-07	6.038E-09	6.896E-14
Ra-226+D	ΣDSR(j)		4.701E-06	4.645E-06	4.533E-06	4.147E-06	3.146E-06	1.066E-06	4.158E-08	4.671E-13
0Ra-226+D	Ra-226+D	1.899E-08	6.752E-08	6.643E-08	6.430E-08	5.738E-08	4.144E-08	1.326E-08	5.115E-10	5.730E-15
Ra-226+D	Pb-210+D3	1.899E-08	2.046E-10	5.981E-10	1.318E-09	3.231E-09	5.348E-09	2.898E-09	1.209E-10	1.379E-15
Ra-226+D	ΣDSR(j)		6.772E-08	6.702E-08	6.562E-08	6.061E-08	4.678E-08	1.616E-08	6.325E-10	7.109E-15
0Ra-226+D1	Ra-226+D1	2.100E-04	1.851E-03	1.821E-03	1.763E-03	1.573E-03	1.136E-03	3.636E-04	1.402E-05	1.569E-10
Ra-226+D1	Pb-210+D1	2.100E-04	6.614E-06	1.933E-05	4.260E-05	1.044E-04	1.729E-04	9.367E-05	3.910E-06	4.465E-11
Ra-226+D1	ΣDSR(j)		1.858E-03	1.840E-03	1.805E-03	1.677E-03	1.309E-03	4.572E-04	1.793E-05	2.015E-10
0Ra-226+D1	Ra-226+D1	2.771E-10	2.443E-09	2.404E-09	2.327E-09	2.076E-09	1.499E-09	4.799E-10	1.851E-11	2.071E-16
Ra-226+D1	Pb-210+D2	2.771E-10	2.145E-12	6.271E-12	1.382E-11	3.388E-11	5.607E-11	3.038E-11	1.268E-12	1.448E-17
Ra-226+D1	ΣDSR(j)		2.445E-09	2.410E-09	2.341E-09	2.110E-09	1.556E-09	5.103E-10	1.977E-11	2.215E-16
0Ra-226+D1	Ra-226+D1	3.989E-12	3.517E-11	3.460E-11	3.349E-11	2.989E-11	2.158E-11	6.908E-12	2.664E-13	2.980E-18
Ra-226+D1	Pb-210+D3	3.989E-12	4.298E-14	1.256E-13	2.768E-13	6.786E-13	1.123E-12	6.086E-13	2.540E-14	2.896E-19
Ra-226+D1	ΣDSR(j)		3.521E-11	3.473E-11	3.377E-11	3.057E-11	2.271E-11	7.516E-12	2.918E-13	3.270E-18
0Ra-226+D2	Ra-226+D2	1.998E-04	6.285E-04	6.183E-04	5.985E-04	5.341E-04	3.857E-04	1.234E-04	4.759E-06	5.322E-11
Ra-226+D2	Pb-210+D1	1.998E-04	6.292E-06	1.839E-05	4.053E-05	9.937E-05	1.645E-04	8.912E-05	3.720E-06	4.249E-11
Ra-226+D2	ΣDSR(j)		6.348E-04	6.367E-04	6.391E-04	6.335E-04	5.502E-04	2.126E-04	8.479E-06	9.571E-11
0Ra-226+D2	Ra-226+D2	2.637E-10	8.296E-10	8.162E-10	7.901E-10	7.050E-10	5.091E-10	1.629E-10	6.282E-12	7.025E-17
Ra-226+D2	Pb-210+D2	2.637E-10	2.041E-12	5.966E-12	1.315E-11	3.223E-11	5.335E-11	2.891E-11	1.207E-12	1.378E-17
Ra-226+D2	ΣDSR(j)		8.317E-10	8.222E-10	8.032E-10	7.372E-10	5.625E-10	1.918E-10	7.489E-12	8.403E-17
0Ra-226+D2	Ra-226+D2	3.795E-12	1.194E-11	1.175E-11	1.137E-11	1.015E-11	7.328E-12	2.345E-12	9.042E-14	1.011E-18
Ra-226+D2	Pb-210+D3	3.795E-12	4.089E-14	1.195E-13	2.633E-13	6.457E-13	1.069E-12	5.791E-13	2.417E-14	2.756E-19
Ra-226+D2	ΣDSR(j)		1.198E-11	1.187E-11	1.164E-11	1.079E-11	8.397E-12	2.924E-12	1.146E-13	1.287E-18
0Ra-226+D3	Ra-226+D3	4.196E-08	3.528E-07	3.471E-07	3.359E-07	2.998E-07	2.165E-07	6.928E-08	2.671E-09	2.987E-14
Ra-226+D3	Pb-210+D1	4.196E-08	1.322E-09	3.863E-09	8.512E-09	2.087E-08	3.454E-08	1.872E-08	7.814E-10	8.924E-15
Ra-226+D3	ΣDSR(j)		3.541E-07	3.509E-07	3.445E-07	3.206E-07	2.510E-07	8.800E-08	3.453E-09	3.879E-14
0Ra-226+D3	Ra-226+D3	5.538E-14	4.656E-13	4.581E-13	4.434E-13	3.957E-13	2.858E-13	9.145E-14	3.526E-15	3.942E-20
Ra-226+D3	Pb-210+D2	5.538E-14	4.287E-16	1.253E-15	2.761E-15	6.770E-15	1.120E-14	6.072E-15	2.535E-16	2.895E-21
Ra-226+D3	ΣDSR(j)		4.661E-13	4.594E-13	4.462E-13	4.025E-13	2.970E-13	9.752E-14	3.779E-15	4.232E-20
0Ra-226+D3	Ra-226+D3	7.972E-16	6.702E-15	6.594E-15	6.383E-15	5.696E-15	4.113E-15	1.316E-15	5.075E-17	5.674E-22
Ra-226+D3	Pb-210+D3	7.972E-16	8.588E-18	2.510E-17	5.531E-17	1.356E-16	2.245E-16	1.216E-16	5.076E-18	5.788E-23
Ra-226+D3	ΣDSR(j)		6.711E-15	6.619E-15	6.438E-15	5.831E-15	4.338E-15	1.438E-15	5.583E-17	6.253E-22
0Ra-226+D4	Ra-226+D4	2.000E-07	5.814E-08	5.720E-08	5.537E-08	4.942E-08	3.570E-08	1.144E-08	4.429E-10	5.055E-15
Ra-226+D4	Pb-210+D1	2.000E-07	6.300E-09	1.842E-08	4.058E-08	9.949E-08	1.647E-07	8.923E-08	3.725E-09	4.254E-14
Ra-226+D4	ΣDSR(j)		6.444E-08	7.562E-08	9.595E-08	1.489E-07	2.004E-07	1.007E-07	4.168E-09	4.759E-14

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 26
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226+D4	Ra-226+D4	2.640E-13	7.674E-14	7.551E-14	7.309E-14	6.523E-14	4.712E-14	1.510E-14	5.846E-16	6.673E-21
Ra-226+D4	Pb-210+D2	2.640E-13	2.044E-15	5.973E-15	1.316E-14	3.227E-14	5.341E-14	2.894E-14	1.208E-15	1.380E-20
Ra-226+D4	ΣDSR(j)		7.879E-14	8.148E-14	8.625E-14	9.750E-14	1.005E-13	4.404E-14	1.793E-15	2.047E-20
0Ra-226+D4	Ra-226+D4	3.800E-15	1.105E-15	1.087E-15	1.052E-15	9.389E-16	6.783E-16	2.173E-16	8.414E-18	9.605E-23
Ra-226+D4	Pb-210+D3	3.800E-15	4.094E-17	1.197E-16	2.637E-16	6.465E-16	1.070E-15	5.798E-16	2.420E-17	2.759E-22
Ra-226+D4	ΣDSR(j)		1.146E-15	1.207E-15	1.316E-15	1.585E-15	1.748E-15	7.971E-16	3.261E-17	3.720E-22
0Ra-228+D	Ra-228+D	1.000E+00	3.143E+00	2.742E+00	2.087E+00	8.035E-01	5.253E-02	3.754E-06	5.354E-18	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	4.992E-01	1.206E+00	1.758E+00	1.126E+00	8.110E-02	5.794E-06	8.237E-18	0.000E+00
Ra-228+D	ΣDSR(j)		3.642E+00	3.948E+00	3.846E+00	1.930E+00	1.336E-01	9.548E-06	1.359E-17	0.000E+00
0Th-228+D	Th-228+D	1.000E+00	2.720E+00	1.893E+00	9.164E-01	7.238E-02	5.126E-05	4.845E-16	0.000E+00	0.000E+00
0Th-230	Th-230	9.996E-01	2.682E-01	2.682E-01	2.682E-01	2.682E-01	2.680E-01	2.675E-01	2.660E-01	2.609E-01
Th-230	Ra-226+D	9.996E-01	7.718E-04	2.299E-03	5.279E-03	1.498E-02	3.729E-02	7.657E-02	9.361E-02	9.078E-02
Th-230	Pb-210+D1	9.996E-01	4.569E-06	3.146E-05	1.601E-04	1.255E-03	7.382E-03	2.794E-02	3.970E-02	3.943E-02
Th-230	ΣDSR(j)		2.690E-01	2.706E-01	2.737E-01	2.844E-01	3.127E-01	3.720E-01	3.993E-01	3.911E-01
0Th-230	Th-230	1.319E-06	3.541E-07	3.541E-07	3.541E-07	3.540E-07	3.538E-07	3.531E-07	3.512E-07	3.444E-07
Th-230	Ra-226+D	1.319E-06	1.019E-09	3.034E-09	6.968E-09	1.977E-08	4.922E-08	1.011E-07	1.236E-07	1.198E-07
Th-230	Pb-210+D2	1.319E-06	1.482E-12	1.020E-11	5.195E-11	4.071E-10	2.394E-09	9.064E-09	1.288E-08	1.279E-08
Th-230	ΣDSR(j)		3.551E-07	3.571E-07	3.611E-07	3.742E-07	4.054E-07	4.632E-07	4.876E-07	4.770E-07
0Th-230	Th-230	1.899E-08	5.097E-09	5.096E-09	5.096E-09	5.095E-09	5.092E-09	5.083E-09	5.054E-09	4.957E-09
Th-230	Ra-226+D	1.899E-08	1.466E-11	4.368E-11	1.003E-10	2.845E-10	7.084E-10	1.455E-09	1.779E-09	1.725E-09
Th-230	Pb-210+D3	1.899E-08	2.969E-14	2.044E-13	1.041E-12	8.155E-12	4.797E-11	1.816E-10	2.579E-10	2.557E-10
Th-230	ΣDSR(j)		5.111E-09	5.140E-09	5.198E-09	5.388E-09	5.849E-09	6.719E-09	7.091E-09	6.938E-09
0Th-230	Th-230	2.100E-04	5.634E-05	5.634E-05	5.634E-05	5.633E-05	5.630E-05	5.619E-05	5.588E-05	5.480E-05
Th-230	Ra-226+D1	2.100E-04	4.020E-07	1.197E-06	2.750E-06	7.800E-06	1.942E-05	3.988E-05	4.874E-05	4.721E-05
Th-230	Pb-210+D1	2.100E-04	9.597E-10	6.607E-09	3.364E-08	2.636E-07	1.551E-06	5.869E-06	8.340E-06	8.282E-06
Th-230	ΣDSR(j)		5.675E-05	5.755E-05	5.912E-05	6.439E-05	7.727E-05	1.019E-04	1.130E-04	1.103E-04
0Th-230	Th-230	2.771E-10	7.437E-11	7.437E-11	7.437E-11	7.435E-11	7.431E-11	7.417E-11	7.376E-11	7.234E-11
Th-230	Ra-226+D1	2.771E-10	5.307E-13	1.581E-12	3.630E-12	1.030E-11	2.564E-11	5.264E-11	6.434E-11	6.232E-11
Th-230	Pb-210+D2	2.771E-10	3.113E-16	2.143E-15	1.091E-14	8.550E-14	5.029E-13	1.904E-12	2.705E-12	2.686E-12
Th-230	ΣDSR(j)		7.490E-11	7.595E-11	7.801E-11	8.473E-11	1.004E-10	1.287E-10	1.408E-10	1.374E-10
0Th-230	Th-230	3.989E-12	1.071E-12	1.070E-12	1.070E-12	1.070E-12	1.070E-12	1.068E-12	1.062E-12	1.041E-12
Th-230	Ra-226+D1	3.989E-12	7.638E-15	2.275E-14	5.224E-14	1.482E-13	3.690E-13	7.577E-13	9.261E-13	8.971E-13
Th-230	Pb-210+D3	3.989E-12	6.236E-18	4.293E-17	2.186E-16	1.713E-15	1.007E-14	3.814E-14	5.418E-14	5.372E-14
Th-230	ΣDSR(j)		1.078E-12	1.093E-12	1.123E-12	1.220E-12	1.449E-12	1.863E-12	2.042E-12	1.992E-12

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 27
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	Th-230	1.998E-04	5.361E-05	5.360E-05	5.360E-05	5.359E-05	5.356E-05	5.346E-05	5.316E-05	5.214E-05
Th-230	Ra-226+D2	1.998E-04	1.365E-07	4.066E-07	9.336E-07	2.649E-06	6.594E-06	1.354E-05	1.655E-05	1.602E-05
Th-230	Pb-210+D1	1.998E-04	9.131E-10	6.286E-09	3.200E-08	2.508E-07	1.475E-06	5.584E-06	7.934E-06	7.879E-06
Th-230	ΣDSR(j)		5.374E-05	5.402E-05	5.457E-05	5.649E-05	6.163E-05	7.258E-05	7.764E-05	7.604E-05
0Th-230	Th-230	2.637E-10	7.076E-11	7.076E-11	7.075E-11	7.074E-11	7.070E-11	7.056E-11	7.017E-11	6.883E-11
Th-230	Ra-226+D2	2.637E-10	1.802E-13	5.367E-13	1.232E-12	3.496E-12	8.704E-12	1.787E-11	2.184E-11	2.115E-11
Th-230	Pb-210+D2	2.637E-10	2.962E-16	2.039E-15	1.038E-14	8.135E-14	4.785E-13	1.811E-12	2.574E-12	2.556E-12
Th-230	ΣDSR(j)		7.094E-11	7.130E-11	7.200E-11	7.432E-11	7.988E-11	9.025E-11	9.459E-11	9.253E-11
0Th-230	Th-230	3.795E-12	1.019E-12	1.018E-12	1.018E-12	1.018E-12	1.018E-12	1.016E-12	1.010E-12	9.907E-13
Th-230	Ra-226+D2	3.795E-12	2.594E-15	7.725E-15	1.774E-14	5.032E-14	1.253E-13	2.573E-13	3.144E-13	3.044E-13
Th-230	Pb-210+D3	3.795E-12	5.933E-18	4.085E-17	2.080E-16	1.630E-15	9.585E-15	3.628E-14	5.155E-14	5.111E-14
Th-230	ΣDSR(j)		1.021E-12	1.026E-12	1.036E-12	1.070E-12	1.153E-12	1.309E-12	1.376E-12	1.346E-12
0Th-230	Th-230	4.196E-08	1.126E-08	1.126E-08	1.126E-08	1.126E-08	1.125E-08	1.123E-08	1.117E-08	1.095E-08
Th-230	Ra-226+D3	4.196E-08	7.661E-11	2.282E-10	5.240E-10	1.487E-09	3.701E-09	7.600E-09	9.287E-09	8.990E-09
Th-230	Pb-210+D1	4.196E-08	1.918E-13	1.320E-12	6.722E-12	5.268E-11	3.099E-10	1.173E-09	1.667E-09	1.655E-09
Th-230	ΣDSR(j)		1.134E-08	1.149E-08	1.179E-08	1.280E-08	1.526E-08	2.000E-08	2.212E-08	2.160E-08
0Th-230	Th-230	5.538E-14	1.486E-14	1.486E-14	1.486E-14	1.486E-14	1.485E-14	1.482E-14	1.474E-14	1.446E-14
Th-230	Ra-226+D3	5.538E-14	1.011E-16	3.012E-16	6.917E-16	1.962E-15	4.885E-15	1.003E-14	1.226E-14	1.187E-14
Th-230	Pb-210+D2	5.538E-14	6.221E-20	4.283E-19	2.180E-18	1.709E-17	1.005E-16	3.805E-16	5.406E-16	5.369E-16
Th-230	ΣDSR(j)		1.496E-14	1.516E-14	1.556E-14	1.684E-14	1.984E-14	2.523E-14	2.754E-14	2.686E-14
0Th-230	Th-230	7.972E-16	2.139E-16	2.139E-16	2.139E-16	2.139E-16	2.138E-16	2.133E-16	2.122E-16	2.081E-16
Th-230	Ra-226+D3	7.972E-16	1.456E-18	4.336E-18	9.956E-18	2.824E-17	7.032E-17	1.444E-16	1.765E-16	1.708E-16
Th-230	Pb-210+D3	7.972E-16	1.246E-21	8.580E-21	4.368E-20	3.423E-19	2.013E-18	7.621E-18	1.083E-17	1.074E-17
Th-230	ΣDSR(j)		2.154E-16	2.183E-16	2.239E-16	2.425E-16	2.861E-16	3.654E-16	3.994E-16	3.896E-16
0Th-230	Th-230	2.000E-07	5.367E-08	5.367E-08	5.367E-08	5.366E-08	5.363E-08	5.352E-08	5.323E-08	5.220E-08
Th-230	Ra-226+D4	2.000E-07	1.263E-11	3.761E-11	8.637E-11	2.451E-10	6.103E-10	1.255E-09	1.540E-09	1.522E-09
Th-230	Pb-210+D1	2.000E-07	9.142E-13	6.294E-12	3.204E-11	2.511E-10	1.477E-09	5.591E-09	7.944E-09	7.889E-09
Th-230	ΣDSR(j)		5.368E-08	5.371E-08	5.378E-08	5.415E-08	5.571E-08	6.037E-08	6.271E-08	6.161E-08
0Th-230	Th-230	2.640E-13	7.085E-14	7.084E-14	7.084E-14	7.083E-14	7.079E-14	7.065E-14	7.026E-14	6.891E-14
Th-230	Ra-226+D4	2.640E-13	1.667E-17	4.965E-17	1.140E-16	3.235E-16	8.056E-16	1.656E-15	2.032E-15	2.008E-15
Th-230	Pb-210+D2	2.640E-13	2.965E-19	2.041E-18	1.039E-17	8.145E-17	4.791E-16	1.814E-15	2.577E-15	2.559E-15
Th-230	ΣDSR(j)		7.086E-14	7.090E-14	7.096E-14	7.123E-14	7.207E-14	7.412E-14	7.487E-14	7.348E-14
0Th-230	Th-230	3.800E-15	1.020E-15	1.020E-15	1.020E-15	1.019E-15	1.019E-15	1.017E-15	1.011E-15	9.919E-16
Th-230	Ra-226+D4	3.800E-15	2.399E-19	7.146E-19	1.641E-18	4.656E-18	1.160E-17	2.384E-17	2.925E-17	2.891E-17
Th-230	Pb-210+D3	3.800E-15	5.940E-21	4.090E-20	2.082E-19	1.632E-18	9.597E-18	3.633E-17	5.161E-17	5.117E-17
Th-230	ΣDSR(j)		1.020E-15	1.020E-15	1.022E-15	1.026E-15	1.040E-15	1.077E-15	1.092E-15	1.072E-15

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 28
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-232	Th-232	1.000E+00	2.999E-01	2.999E-01	2.999E-01	2.999E-01	2.998E-01	2.994E-01	2.983E-01	2.944E-01
Th-232	Ra-228+D	1.000E+00	1.937E-01	5.478E-01	1.126E+00	2.261E+00	2.923E+00	2.965E+00	2.949E+00	2.888E+00
Th-232	Th-228+D	1.000E+00	2.090E-02	1.276E-01	5.020E-01	1.806E+00	2.792E+00	2.855E+00	2.831E+00	2.731E+00
Th-232	ΣDSR(j)		5.145E-01	9.754E-01	1.928E+00	4.367E+00	6.015E+00	6.119E+00	6.079E+00	5.913E+00
0U-234	U-234	9.996E-01	2.523E-02	2.468E-02	2.361E-02	2.022E-02	1.299E-02	2.759E-03	3.301E-05	6.178E-12
U-234	Th-230	9.996E-01	1.224E-06	3.637E-06	8.305E-06	2.311E-05	5.468E-05	9.922E-05	1.105E-04	1.085E-04
U-234	Ra-226+D	9.996E-01	2.356E-09	1.631E-08	8.411E-08	6.888E-07	4.536E-06	2.231E-05	3.826E-05	3.777E-05
U-234	Pb-210+D1	9.996E-01	1.049E-11	1.546E-10	1.736E-09	4.010E-08	6.676E-07	7.112E-06	1.607E-05	1.640E-05
U-234	ΣDSR(j)		2.523E-02	2.468E-02	2.362E-02	2.024E-02	1.305E-02	2.888E-03	1.979E-04	1.627E-04
0U-234	U-234	1.319E-06	3.330E-08	3.257E-08	3.116E-08	2.669E-08	1.715E-08	3.642E-09	4.357E-11	8.154E-18
U-234	Th-230	1.319E-06	1.616E-12	4.801E-12	1.096E-11	3.050E-11	7.218E-11	1.310E-10	1.459E-10	1.433E-10
U-234	Ra-226+D	1.319E-06	3.110E-15	2.153E-14	1.110E-13	9.093E-13	5.988E-12	2.944E-11	5.050E-11	4.985E-11
U-234	Pb-210+D2	1.319E-06	3.402E-18	5.016E-17	5.631E-16	1.301E-14	2.166E-13	2.307E-12	5.214E-12	5.321E-12
U-234	ΣDSR(j)		3.331E-08	3.258E-08	3.118E-08	2.672E-08	1.722E-08	3.805E-09	2.452E-10	1.985E-10
0U-234	U-234	1.899E-08	4.794E-10	4.689E-10	4.486E-10	3.842E-10	2.468E-10	5.243E-11	6.271E-13	1.174E-19
U-234	Th-230	1.899E-08	2.326E-14	6.910E-14	1.578E-13	4.390E-13	1.039E-12	1.885E-12	2.100E-12	2.062E-12
U-234	Ra-226+D	1.899E-08	4.476E-17	3.099E-16	1.598E-15	1.309E-14	8.619E-14	4.238E-13	7.269E-13	7.176E-13
U-234	Pb-210+D3	1.899E-08	6.815E-20	1.005E-18	1.128E-17	2.606E-16	4.338E-15	4.621E-14	1.044E-13	1.064E-13
U-234	ΣDSR(j)		4.794E-10	4.689E-10	4.487E-10	3.847E-10	2.479E-10	5.478E-11	3.558E-12	2.886E-12
0U-234	U-234	2.100E-04	5.299E-06	5.183E-06	4.959E-06	4.247E-06	2.728E-06	5.796E-07	6.933E-09	1.298E-15
U-234	Th-230	2.100E-04	2.571E-10	7.639E-10	1.744E-09	4.853E-09	1.149E-08	2.084E-08	2.322E-08	2.280E-08
U-234	Ra-226+D1	2.100E-04	1.227E-12	8.496E-12	4.381E-11	3.588E-10	2.363E-09	1.162E-08	1.992E-08	1.964E-08
U-234	Pb-210+D1	2.100E-04	2.203E-15	3.248E-14	3.647E-13	8.423E-12	1.402E-10	1.494E-09	3.376E-09	3.445E-09
U-234	ΣDSR(j)		5.300E-06	5.184E-06	4.961E-06	4.253E-06	2.742E-06	6.135E-07	5.345E-08	4.589E-08
0U-234	U-234	2.771E-10	6.995E-12	6.842E-12	6.546E-12	5.606E-12	3.601E-12	7.651E-13	9.151E-15	1.713E-21
U-234	Th-230	2.771E-10	3.394E-16	1.008E-15	2.303E-15	6.406E-15	1.516E-14	2.751E-14	3.065E-14	3.010E-14
U-234	Ra-226+D1	2.771E-10	1.620E-18	1.121E-17	5.783E-17	4.736E-16	3.119E-15	1.534E-14	2.630E-14	2.593E-14
U-234	Pb-210+D2	2.771E-10	7.146E-22	1.054E-20	1.183E-19	2.732E-18	4.549E-17	4.845E-16	1.095E-15	1.118E-15
U-234	ΣDSR(j)		6.996E-12	6.843E-12	6.548E-12	5.613E-12	3.620E-12	8.084E-13	6.719E-14	5.714E-14
0U-234	U-234	3.989E-12	1.007E-13	9.849E-14	9.422E-14	8.070E-14	5.184E-14	1.101E-14	1.317E-16	2.465E-23
U-234	Th-230	3.989E-12	4.886E-18	1.451E-17	3.314E-17	9.221E-17	2.182E-16	3.960E-16	4.411E-16	4.332E-16
U-234	Ra-226+D1	3.989E-12	2.331E-20	1.614E-19	8.324E-19	6.817E-18	4.489E-17	2.207E-16	3.785E-16	3.732E-16
U-234	Pb-210+D3	3.989E-12	1.431E-23	2.111E-22	2.370E-21	5.473E-20	9.112E-19	9.706E-18	2.193E-17	2.235E-17
U-234	ΣDSR(j)		1.007E-13	9.850E-14	9.426E-14	8.080E-14	5.210E-14	1.164E-14	9.733E-16	8.288E-16
0U-234	U-234	1.998E-04	5.042E-06	4.932E-06	4.718E-06	4.041E-06	2.596E-06	5.514E-07	6.596E-09	1.235E-15
U-234	Th-230	1.998E-04	2.447E-10	7.268E-10	1.660E-09	4.617E-09	1.093E-08	1.983E-08	2.209E-08	2.169E-08
U-234	Ra-226+D2	1.998E-04	4.167E-13	2.885E-12	1.488E-11	1.218E-10	8.023E-10	3.944E-09	6.763E-09	6.664E-09
U-234	Pb-210+D1	1.998E-04	2.096E-15	3.090E-14	3.469E-13	8.014E-12	1.334E-10	1.421E-09	3.212E-09	3.278E-09
U-234	ΣDSR(j)		5.042E-06	4.932E-06	4.720E-06	4.046E-06	2.608E-06	5.766E-07	3.866E-08	3.163E-08

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	2.637E-10	6.655E-12	6.510E-12	6.228E-12	5.334E-12	3.426E-12	7.279E-13	8.707E-15	1.630E-21
U-234	Th-230	2.637E-10	3.229E-16	9.594E-16	2.191E-15	6.095E-15	1.442E-14	2.617E-14	2.916E-14	2.863E-14
U-234	Ra-226+D2	2.637E-10	5.500E-19	3.808E-18	1.964E-17	1.608E-16	1.059E-15	5.207E-15	8.927E-15	8.797E-15
U-234	Pb-210+D2	2.637E-10	6.798E-22	1.002E-20	1.125E-19	2.599E-18	4.328E-17	4.610E-16	1.042E-15	1.063E-15
U-234	ΣDSR(j)		6.656E-12	6.511E-12	6.230E-12	5.340E-12	3.442E-12	7.597E-13	4.783E-14	3.849E-14
0U-234	U-234	3.795E-12	9.580E-14	9.370E-14	8.964E-14	7.678E-14	4.932E-14	1.048E-14	1.253E-16	2.346E-23
U-234	Th-230	3.795E-12	4.648E-18	1.381E-17	3.153E-17	8.773E-17	2.076E-16	3.767E-16	4.197E-16	4.121E-16
U-234	Ra-226+D2	3.795E-12	7.917E-21	5.481E-20	2.826E-19	2.315E-18	1.524E-17	7.494E-17	1.285E-16	1.266E-16
U-234	Pb-210+D3	3.795E-12	1.362E-23	2.008E-22	2.254E-21	5.207E-20	8.669E-19	9.235E-18	2.087E-17	2.126E-17
U-234	ΣDSR(j)		9.580E-14	9.371E-14	8.968E-14	7.687E-14	4.954E-14	1.094E-14	6.944E-16	5.600E-16
0U-234	U-234	4.196E-08	1.059E-09	1.036E-09	9.910E-10	8.488E-10	5.452E-10	1.158E-10	1.385E-12	2.593E-19
U-234	Th-230	4.196E-08	5.139E-14	1.527E-13	3.486E-13	9.699E-13	2.295E-12	4.165E-12	4.639E-12	4.556E-12
U-234	Ra-226+D3	4.196E-08	2.339E-16	1.619E-15	8.349E-15	6.838E-14	4.503E-13	2.214E-12	3.796E-12	3.740E-12
U-234	Pb-210+D1	4.196E-08	4.402E-19	6.491E-18	7.287E-17	1.683E-15	2.802E-14	2.985E-13	6.747E-13	6.885E-13
U-234	ΣDSR(j)		1.059E-09	1.036E-09	9.914E-10	8.498E-10	5.480E-10	1.225E-10	1.050E-11	8.985E-12
0U-234	U-234	5.538E-14	1.398E-15	1.367E-15	1.308E-15	1.120E-15	7.197E-16	1.529E-16	1.829E-18	3.423E-25
U-234	Th-230	5.538E-14	6.783E-20	2.015E-19	4.601E-19	1.280E-18	3.030E-18	5.497E-18	6.124E-18	6.014E-18
U-234	Ra-226+D3	5.538E-14	3.087E-22	2.137E-21	1.102E-20	9.026E-20	5.944E-19	2.922E-18	5.010E-18	4.937E-18
U-234	Pb-210+D2	5.538E-14	1.428E-25	2.105E-24	2.364E-23	5.460E-22	9.090E-21	9.683E-20	2.188E-19	2.233E-19
U-234	ΣDSR(j)		1.398E-15	1.368E-15	1.309E-15	1.122E-15	7.233E-16	1.614E-16	1.318E-17	1.117E-17
0U-234	U-234	7.972E-16	2.012E-17	1.968E-17	1.883E-17	1.613E-17	1.036E-17	2.201E-18	2.632E-20	4.927E-27
U-234	Th-230	7.972E-16	9.764E-22	2.901E-21	6.623E-21	1.843E-20	4.361E-20	7.913E-20	8.815E-20	8.657E-20
U-234	Ra-226+D3	7.972E-16	4.443E-24	3.076E-23	1.586E-22	1.299E-21	8.556E-21	4.206E-20	7.212E-20	7.106E-20
U-234	Pb-210+D3	7.972E-16	2.861E-27	4.218E-26	4.735E-25	1.094E-23	1.821E-22	1.940E-21	4.383E-21	4.466E-21
U-234	ΣDSR(j)		2.012E-17	1.968E-17	1.884E-17	1.615E-17	1.041E-17	2.324E-18	1.910E-19	1.621E-19
0U-234	U-234	2.000E-07	5.048E-09	4.938E-09	4.724E-09	4.046E-09	2.599E-09	5.521E-10	6.604E-12	1.236E-18
U-234	Th-230	2.000E-07	2.450E-13	7.277E-13	1.662E-12	4.623E-12	1.094E-11	1.985E-11	2.211E-11	2.172E-11
U-234	Ra-226+D4	2.000E-07	3.854E-17	2.669E-16	1.376E-15	1.127E-14	7.426E-14	3.655E-13	6.293E-13	6.330E-13
U-234	Pb-210+D1	2.000E-07	2.098E-18	3.094E-17	3.474E-16	8.024E-15	1.336E-13	1.423E-12	3.216E-12	3.282E-12
U-234	ΣDSR(j)		5.048E-09	4.938E-09	4.725E-09	4.051E-09	2.610E-09	5.737E-10	3.256E-11	2.563E-11
0U-234	U-234	2.640E-13	6.663E-15	6.518E-15	6.235E-15	5.341E-15	3.431E-15	7.288E-16	8.717E-18	1.632E-24
U-234	Th-230	2.640E-13	3.233E-19	9.605E-19	2.193E-18	6.102E-18	1.444E-17	2.620E-17	2.919E-17	2.867E-17
U-234	Ra-226+D4	2.640E-13	5.088E-23	3.523E-22	1.816E-21	1.488E-20	9.802E-20	4.825E-19	8.307E-19	8.356E-19
U-234	Pb-210+D2	2.640E-13	6.807E-25	1.004E-23	1.127E-22	2.603E-21	4.333E-20	4.616E-19	1.043E-18	1.065E-18
U-234	ΣDSR(j)		6.664E-15	6.519E-15	6.238E-15	5.347E-15	3.445E-15	7.559E-16	3.978E-17	3.057E-17
0U-234	U-234	3.800E-15	9.591E-17	9.381E-17	8.975E-17	7.687E-17	4.938E-17	1.049E-17	1.255E-19	2.348E-26
U-234	Th-230	3.800E-15	4.654E-21	1.383E-20	3.157E-20	8.784E-20	2.079E-19	3.772E-19	4.202E-19	4.126E-19
U-234	Ra-226+D4	3.800E-15	7.323E-25	5.071E-24	2.615E-23	2.142E-22	1.411E-21	6.945E-21	1.196E-20	1.203E-20
U-234	Pb-210+D3	3.800E-15	1.364E-26	2.011E-25	2.257E-24	5.214E-23	8.680E-22	9.246E-21	2.089E-20	2.129E-20
U-234	ΣDSR(j)		9.592E-17	9.383E-17	8.978E-17	7.696E-17	4.959E-17	1.088E-17	5.785E-19	4.460E-19

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 30
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-235+D	U-235+D	9.835E-01	2.589E-01	2.532E-01	2.423E-01	2.075E-01	1.333E-01	2.833E-02	3.391E-04	6.356E-11
U-235+D	Pa-231	9.835E-01	6.019E-06	1.770E-05	3.955E-05	1.016E-04	1.897E-04	1.327E-04	4.738E-06	2.936E-12
U-235+D	Ac-227+D	9.835E-01	1.591E-07	1.073E-06	5.216E-06	3.480E-05	1.334E-04	1.402E-04	5.609E-06	3.601E-12
U-235+D	ΣDSR(j)		2.589E-01	2.533E-01	2.423E-01	2.077E-01	1.336E-01	2.860E-02	3.495E-04	7.010E-11
0U-235+D	U-235+D	2.722E-03	7.166E-04	7.009E-04	6.706E-04	5.743E-04	3.690E-04	7.841E-05	9.386E-07	1.759E-13
U-235+D	Pa-231	2.722E-03	1.666E-08	4.900E-08	1.095E-07	2.813E-07	5.249E-07	3.672E-07	1.311E-08	8.125E-15
U-235+D	Ac-227+D1	2.722E-03	4.424E-10	2.984E-09	1.451E-08	9.678E-08	3.711E-07	3.899E-07	1.560E-08	1.001E-14
U-235+D	ΣDSR(j)		7.166E-04	7.009E-04	6.707E-04	5.747E-04	3.699E-04	7.916E-05	9.673E-07	1.941E-13
0U-235+D	U-235+D	1.376E-02	3.623E-03	3.544E-03	3.390E-03	2.904E-03	1.865E-03	3.964E-04	4.745E-06	8.894E-13
U-235+D	Pa-231	1.376E-02	8.421E-08	2.477E-07	5.534E-07	1.422E-06	2.654E-06	1.857E-06	6.630E-08	4.108E-14
U-235+D	Ac-227+D2	1.376E-02	2.004E-09	1.352E-08	6.572E-08	4.384E-07	1.681E-06	1.766E-06	7.067E-08	4.536E-14
U-235+D	ΣDSR(j)		3.623E-03	3.544E-03	3.391E-03	2.906E-03	1.870E-03	4.000E-04	4.882E-06	9.758E-13
0U-235+D	U-235+D	3.809E-05	1.003E-05	9.807E-06	9.383E-06	8.036E-06	5.163E-06	1.097E-06	1.313E-08	2.461E-15
U-235+D	Pa-231	3.809E-05	2.331E-10	6.856E-10	1.532E-09	3.936E-09	7.345E-09	5.139E-09	1.835E-10	1.137E-16
U-235+D	Ac-227+D3	3.809E-05	5.578E-12	3.762E-11	1.829E-10	1.220E-09	4.678E-09	4.915E-09	1.967E-10	1.262E-16
U-235+D	ΣDSR(j)		1.003E-05	9.808E-06	9.384E-06	8.042E-06	5.175E-06	1.107E-06	1.351E-08	2.701E-15
0U-235+D	U-235+D	8.257E-07	2.174E-07	2.126E-07	2.034E-07	1.742E-07	1.119E-07	2.378E-08	2.847E-10	5.337E-17
U-235+D	Pa-231	8.257E-07	5.053E-12	1.486E-11	3.320E-11	8.534E-11	1.592E-10	1.114E-10	3.978E-12	2.465E-18
U-235+D	Ac-227+D4	8.257E-07	1.059E-13	7.139E-13	3.471E-12	2.315E-11	8.877E-11	9.326E-11	3.729E-12	2.385E-18
U-235+D	ΣDSR(j)		2.174E-07	2.126E-07	2.035E-07	1.743E-07	1.122E-07	2.399E-08	2.924E-10	5.822E-17
0U-235+D	U-235+D	2.285E-09	6.016E-10	5.885E-10	5.630E-10	4.822E-10	3.098E-10	6.583E-11	7.880E-13	1.477E-19
U-235+D	Pa-231	2.285E-09	1.399E-14	4.114E-14	9.190E-14	2.362E-13	4.407E-13	3.083E-13	1.101E-14	6.822E-21
U-235+D	Ac-227+D5	2.285E-09	2.948E-16	1.988E-15	9.666E-15	6.448E-14	2.472E-13	2.597E-13	1.038E-14	6.640E-21
U-235+D	ΣDSR(j)		6.016E-10	5.885E-10	5.631E-10	4.825E-10	3.105E-10	6.640E-11	8.094E-13	1.612E-19
0U-238	U-238	5.450E-07	1.237E-08	1.210E-08	1.158E-08	9.917E-09	6.371E-09	1.354E-09	1.620E-11	3.038E-18
0U-238+D	U-238+D	1.599E-03	4.310E-03	4.215E-03	4.033E-03	3.454E-03	2.218E-03	4.710E-04	5.622E-06	1.039E-12
U-238+D	U-234	1.599E-03	5.678E-11	1.670E-10	3.731E-10	9.590E-10	1.790E-09	1.253E-09	4.482E-11	2.796E-17
U-238+D	Th-230	1.599E-03	1.837E-15	1.270E-14	6.522E-14	5.271E-13	3.347E-12	1.480E-11	2.240E-11	2.219E-11
U-238+D	Ra-226+D	1.599E-03	2.654E-18	3.930E-17	4.454E-16	1.064E-14	1.936E-13	2.603E-12	7.486E-12	7.720E-12
U-238+D	Pb-210+D1	1.599E-03	9.468E-21	2.883E-19	6.987E-18	4.742E-16	2.257E-14	7.239E-13	3.086E-12	3.353E-12
U-238+D	ΣDSR(j)		4.310E-03	4.215E-03	4.033E-03	3.454E-03	2.218E-03	4.710E-04	5.622E-06	3.430E-11
0U-238+D	U-238+D	2.111E-09	5.689E-09	5.564E-09	5.323E-09	4.559E-09	2.928E-09	6.217E-10	7.421E-12	1.372E-18
U-238+D	U-234	2.111E-09	7.495E-17	2.205E-16	4.925E-16	1.266E-15	2.362E-15	1.654E-15	5.917E-17	3.691E-23
U-238+D	Th-230	2.111E-09	2.424E-21	1.676E-20	8.609E-20	6.958E-19	4.418E-18	1.954E-17	2.956E-17	2.929E-17
U-238+D	Ra-226+D	2.111E-09	3.503E-24	5.187E-23	5.879E-22	1.404E-20	2.555E-19	3.436E-18	9.881E-18	1.019E-17
U-238+D	Pb-210+D2	2.111E-09	3.071E-27	9.353E-26	2.266E-24	1.538E-22	7.322E-21	2.348E-19	1.001E-18	1.088E-18
U-238+D	ΣDSR(j)		5.689E-09	5.564E-09	5.323E-09	4.559E-09	2.928E-09	6.217E-10	7.421E-12	4.194E-17

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 31
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	3.039E-11	8.188E-11	8.009E-11	7.662E-11	6.562E-11	4.215E-11	8.948E-12	1.068E-13	1.975E-20
U-238+D	U-234	3.039E-11	1.079E-18	3.173E-18	7.089E-18	1.822E-17	3.400E-17	2.381E-17	8.517E-19	5.313E-25
U-238+D	Th-230	3.039E-11	3.490E-23	2.412E-22	1.239E-21	1.002E-20	6.360E-20	2.812E-19	4.255E-19	4.216E-19
U-238+D	Ra-226+D	3.039E-11	5.042E-26	7.467E-25	8.462E-24	2.021E-22	3.678E-21	4.946E-20	1.422E-19	1.467E-19
U-238+D	Pb-210+D3	3.039E-11	6.152E-29	1.874E-27	4.540E-26	3.081E-24	1.467E-22	4.704E-21	2.005E-20	2.175E-20
U-238+D	ΣDSR(j)		8.188E-11	8.009E-11	7.662E-11	6.562E-11	4.215E-11	8.948E-12	1.068E-13	6.098E-19
0U-238+D	U-238+D	3.359E-07	9.052E-07	8.854E-07	8.470E-07	7.254E-07	4.659E-07	9.892E-08	1.181E-09	2.183E-16
U-238+D	U-234	3.359E-07	1.193E-14	3.508E-14	7.837E-14	2.014E-13	3.759E-13	2.632E-13	9.415E-15	5.873E-21
U-238+D	Th-230	3.359E-07	3.858E-19	2.667E-18	1.370E-17	1.107E-16	7.031E-16	3.109E-15	4.704E-15	4.661E-15
U-238+D	Ra-226+D1	3.359E-07	1.382E-21	2.047E-20	2.320E-19	5.542E-18	1.008E-16	1.356E-15	3.898E-15	4.015E-15
U-238+D	Pb-210+D1	3.359E-07	1.989E-24	6.056E-23	1.468E-21	9.960E-20	4.742E-18	1.521E-16	6.482E-16	7.043E-16
U-238+D	ΣDSR(j)		9.052E-07	8.854E-07	8.470E-07	7.254E-07	4.659E-07	9.892E-08	1.181E-09	9.598E-15
0U-238+D	U-238+D	4.434E-13	1.195E-12	1.169E-12	1.118E-12	9.576E-13	6.150E-13	1.306E-13	1.559E-15	2.881E-22
U-238+D	U-234	4.434E-13	1.574E-20	4.631E-20	1.034E-19	2.659E-19	4.962E-19	3.474E-19	1.243E-20	7.752E-27
U-238+D	Th-230	4.434E-13	5.092E-25	3.520E-24	1.808E-23	1.462E-22	9.280E-22	4.103E-21	6.210E-21	6.152E-21
U-238+D	Ra-226+D1	4.434E-13	1.825E-27	2.702E-26	3.062E-25	7.315E-24	1.331E-22	1.790E-21	5.145E-21	5.300E-21
U-238+D	Pb-210+D2	4.434E-13	6.450E-31	1.964E-29	4.760E-28	3.231E-26	1.538E-24	4.932E-23	2.103E-22	2.285E-22
U-238+D	ΣDSR(j)		1.195E-12	1.169E-12	1.118E-12	9.576E-13	6.150E-13	1.306E-13	1.559E-15	1.197E-20
0U-238+D	U-238+D	6.383E-15	1.720E-14	1.682E-14	1.609E-14	1.378E-14	8.853E-15	1.880E-15	2.244E-17	4.147E-24
U-238+D	U-234	6.383E-15	2.266E-22	6.665E-22	1.489E-21	3.827E-21	7.142E-21	5.000E-21	1.789E-22	1.116E-28
U-238+D	Th-230	6.383E-15	7.330E-27	5.067E-26	2.603E-25	2.104E-24	1.336E-23	5.906E-23	8.938E-23	8.855E-23
U-238+D	Ra-226+D1	6.383E-15	2.627E-29	3.889E-28	4.408E-27	1.053E-25	1.916E-24	2.576E-23	7.406E-23	7.629E-23
U-238+D	Pb-210+D3	6.383E-15	1.292E-32	3.935E-31	9.536E-30	6.472E-28	3.081E-26	9.880E-25	4.211E-24	4.568E-24
U-238+D	ΣDSR(j)		1.720E-14	1.682E-14	1.609E-14	1.378E-14	8.853E-15	1.880E-15	2.244E-17	1.736E-22
0U-238+D	U-238+D	3.196E-07	8.612E-07	8.424E-07	8.059E-07	6.902E-07	4.433E-07	9.412E-08	1.124E-09	2.077E-16
U-238+D	U-234	3.196E-07	1.135E-14	3.338E-14	7.456E-14	1.916E-13	3.576E-13	2.504E-13	8.958E-15	5.588E-21
U-238+D	Th-230	3.196E-07	3.671E-19	2.537E-18	1.303E-17	1.053E-16	6.689E-16	2.957E-15	4.476E-15	4.434E-15
U-238+D	Ra-226+D2	3.196E-07	4.694E-22	6.950E-21	7.877E-20	1.882E-18	3.424E-17	4.603E-16	1.323E-15	1.362E-15
U-238+D	Pb-210+D1	3.196E-07	1.892E-24	5.762E-23	1.396E-21	9.477E-20	4.511E-18	1.447E-16	6.167E-16	6.701E-16
U-238+D	ΣDSR(j)		8.612E-07	8.424E-07	8.059E-07	6.902E-07	4.433E-07	9.412E-08	1.124E-09	6.674E-15
0U-238+D	U-238+D	4.219E-13	1.137E-12	1.112E-12	1.064E-12	9.111E-13	5.851E-13	1.242E-13	1.483E-15	2.741E-22
U-238+D	U-234	4.219E-13	1.498E-20	4.406E-20	9.842E-20	2.530E-19	4.721E-19	3.305E-19	1.182E-20	7.376E-27
U-238+D	Th-230	4.219E-13	4.845E-25	3.349E-24	1.720E-23	1.391E-22	8.830E-22	3.904E-21	5.908E-21	5.853E-21
U-238+D	Ra-226+D2	4.219E-13	6.196E-28	9.175E-27	1.040E-25	2.484E-24	4.519E-23	6.077E-22	1.747E-21	1.798E-21
U-238+D	Pb-210+D2	4.219E-13	6.137E-31	1.869E-29	4.529E-28	3.074E-26	1.463E-24	4.693E-23	2.001E-22	2.174E-22
U-238+D	ΣDSR(j)		1.137E-12	1.112E-12	1.064E-12	9.111E-13	5.851E-13	1.242E-13	1.483E-15	8.143E-21

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 32
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.073E-15	1.636E-14	1.601E-14	1.531E-14	1.311E-14	8.423E-15	1.788E-15	2.135E-17	3.946E-24
U-238+D	U-234	6.073E-15	2.156E-22	6.342E-22	1.417E-21	3.641E-21	6.795E-21	4.757E-21	1.702E-22	1.062E-28
U-238+D	Th-230	6.073E-15	6.974E-27	4.821E-26	2.476E-25	2.002E-24	1.271E-23	5.619E-23	8.504E-23	8.425E-23
U-238+D	Ra-226+D2	6.073E-15	8.918E-30	1.321E-28	1.497E-27	3.575E-26	6.505E-25	8.747E-24	2.514E-23	2.588E-23
U-238+D	Pb-210+D3	6.073E-15	1.229E-32	3.744E-31	9.072E-30	6.158E-28	2.931E-26	9.400E-25	4.007E-24	4.346E-24
U-238+D	ΣDSR(j)		1.636E-14	1.601E-14	1.531E-14	1.311E-14	8.423E-15	1.788E-15	2.135E-17	1.184E-22
0U-238+D	U-238+D	6.713E-11	1.809E-10	1.769E-10	1.693E-10	1.450E-10	9.311E-11	1.977E-11	2.360E-13	4.362E-20
U-238+D	U-234	6.713E-11	2.383E-18	7.011E-18	1.566E-17	4.025E-17	7.512E-17	5.259E-17	1.881E-18	1.174E-24
U-238+D	Th-230	6.713E-11	7.710E-23	5.329E-22	2.738E-21	2.213E-20	1.405E-19	6.212E-19	9.401E-19	9.314E-19
U-238+D	Ra-226+D3	6.713E-11	2.634E-25	3.901E-24	4.421E-23	1.056E-21	1.922E-20	2.584E-19	7.427E-19	7.645E-19
U-238+D	Pb-210+D1	6.713E-11	3.974E-28	1.210E-26	2.933E-25	1.991E-23	9.476E-22	3.039E-20	1.295E-19	1.407E-19
U-238+D	ΣDSR(j)		1.809E-10	1.769E-10	1.693E-10	1.450E-10	9.311E-11	1.977E-11	2.360E-13	1.880E-18
0U-238+D	U-238+D	8.862E-17	2.388E-16	2.336E-16	2.234E-16	1.914E-16	1.229E-16	2.609E-17	3.115E-19	5.758E-26
U-238+D	U-234	8.862E-17	3.146E-24	9.254E-24	2.067E-23	5.314E-23	9.916E-23	6.942E-23	2.484E-24	1.549E-30
U-238+D	Th-230	8.862E-17	1.018E-28	7.034E-28	3.614E-27	2.921E-26	1.855E-25	8.200E-25	1.241E-24	1.229E-24
U-238+D	Ra-226+D3	8.862E-17	3.477E-31	5.149E-30	5.836E-29	1.394E-27	2.537E-26	3.411E-25	9.803E-25	1.009E-24
U-238+D	Pb-210+D2	8.862E-17	1.289E-34	3.926E-33	9.512E-32	6.456E-30	3.074E-28	9.857E-27	4.202E-26	4.565E-26
U-238+D	ΣDSR(j)		2.388E-16	2.336E-16	2.234E-16	1.914E-16	1.229E-16	2.609E-17	3.115E-19	2.342E-24
0U-238+D	U-238+D	1.276E-18	3.437E-18	3.362E-18	3.216E-18	2.754E-18	1.769E-18	3.756E-19	4.484E-21	8.288E-28
U-238+D	U-234	1.276E-18	4.528E-26	1.332E-25	2.976E-25	7.648E-25	1.427E-24	9.992E-25	3.575E-26	2.230E-32
U-238+D	Th-230	1.276E-18	1.465E-30	1.013E-29	5.202E-29	4.204E-28	2.669E-27	1.180E-26	1.786E-26	1.770E-26
U-238+D	Ra-226+D3	1.276E-18	5.005E-33	7.412E-32	8.400E-31	2.007E-29	3.651E-28	4.909E-27	1.411E-26	1.453E-26
U-238+D	Pb-210+D3	1.276E-18	2.582E-36	7.865E-35	1.906E-33	1.293E-31	6.157E-30	1.974E-28	8.416E-28	9.129E-28
U-238+D	ΣDSR(j)		3.437E-18	3.362E-18	3.216E-18	2.754E-18	1.769E-18	3.756E-19	4.484E-21	3.396E-26
0U-238+D	U-238+D	3.200E-10	8.623E-10	8.434E-10	8.069E-10	6.910E-10	4.438E-10	9.423E-11	1.125E-12	2.079E-19
U-238+D	U-234	3.200E-10	1.136E-17	3.342E-17	7.465E-17	1.919E-16	3.581E-16	2.507E-16	8.968E-18	5.594E-24
U-238+D	Th-230	3.200E-10	3.675E-22	2.540E-21	1.305E-20	1.055E-19	6.697E-19	2.961E-18	4.481E-18	4.439E-18
U-238+D	Ra-226+D4	3.200E-10	4.342E-26	6.430E-25	7.287E-24	1.741E-22	3.169E-21	4.266E-20	1.231E-19	1.294E-19
U-238+D	Pb-210+D1	3.200E-10	1.894E-27	5.769E-26	1.398E-24	9.488E-23	4.517E-21	1.448E-19	6.175E-19	6.709E-19
U-238+D	ΣDSR(j)		8.623E-10	8.434E-10	8.069E-10	6.910E-10	4.438E-10	9.423E-11	1.125E-12	5.448E-18
0U-238+D	U-238+D	4.224E-16	1.138E-15	1.113E-15	1.065E-15	9.122E-16	5.859E-16	1.244E-16	1.485E-18	2.745E-25
U-238+D	U-234	4.224E-16	1.500E-23	4.411E-23	9.854E-23	2.533E-22	4.727E-22	3.309E-22	1.184E-23	7.385E-30
U-238+D	Th-230	4.224E-16	4.851E-28	3.353E-27	1.723E-26	1.392E-25	8.840E-25	3.909E-24	5.915E-24	5.860E-24
U-238+D	Ra-226+D4	4.224E-16	5.732E-32	8.487E-31	9.619E-30	2.298E-28	4.183E-27	5.631E-26	1.625E-25	1.708E-25
U-238+D	Pb-210+D2	4.224E-16	6.145E-34	1.871E-32	4.534E-31	3.078E-29	1.465E-27	4.698E-26	2.003E-25	2.176E-25
U-238+D	ΣDSR(j)		1.138E-15	1.113E-15	1.065E-15	9.122E-16	5.859E-16	1.244E-16	1.485E-18	6.523E-24

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 33
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D	U-238+D	6.080E-18	1.638E-17	1.602E-17	1.533E-17	1.313E-17	8.433E-18	1.790E-18	2.137E-20	3.951E-27
U-238+D	U-234	6.080E-18	2.158E-25	6.349E-25	1.418E-24	3.646E-24	6.803E-24	4.763E-24	1.704E-25	1.063E-31
U-238+D	Th-230	6.080E-18	6.982E-30	4.826E-29	2.479E-28	2.004E-27	1.272E-26	5.626E-26	8.514E-26	8.435E-26
U-238+D	Ra-226+D4	6.080E-18	8.250E-34	1.222E-32	1.385E-31	3.308E-30	6.021E-29	8.106E-28	2.339E-27	2.459E-27
U-238+D	Pb-210+D3	6.080E-18	1.231E-35	3.749E-34	9.083E-33	6.165E-31	2.935E-29	9.411E-28	4.011E-27	4.352E-27
U-238+D	ΣDSR(j)		1.638E-17	1.602E-17	1.533E-17	1.313E-17	8.433E-18	1.790E-18	2.137E-20	9.511E-26
0U-238+D1	U-238+D1	9.980E-01	7.237E-02	7.079E-02	6.772E-02	5.800E-02	3.726E-02	7.913E-03	9.458E-05	1.761E-11
U-238+D1	U-234	9.980E-01	3.543E-08	1.042E-07	2.328E-07	5.984E-07	1.117E-06	7.818E-07	2.797E-08	1.745E-14
U-238+D1	Th-230	9.980E-01	1.146E-12	7.922E-12	4.070E-11	3.289E-10	2.089E-09	9.235E-09	1.398E-08	1.385E-08
U-238+D1	Ra-226+D	9.980E-01	1.656E-15	2.452E-14	2.779E-13	6.639E-12	1.208E-10	1.624E-09	4.671E-09	4.817E-09
U-238+D1	Pb-210+D1	9.980E-01	5.908E-18	1.799E-16	4.360E-15	2.959E-13	1.409E-11	4.517E-10	1.926E-09	2.092E-09
U-238+D1	ΣDSR(j)		7.237E-02	7.079E-02	6.772E-02	5.800E-02	3.726E-02	7.914E-03	9.463E-05	2.077E-08
0U-238+D1	U-238+D1	1.317E-06	9.553E-08	9.344E-08	8.940E-08	7.656E-08	4.918E-08	1.045E-08	1.248E-10	2.324E-17
U-238+D1	U-234	1.317E-06	4.677E-14	1.376E-13	3.073E-13	7.899E-13	1.474E-12	1.032E-12	3.692E-14	2.303E-20
U-238+D1	Th-230	1.317E-06	1.513E-18	1.046E-17	5.372E-17	4.342E-16	2.757E-15	1.219E-14	1.845E-14	1.828E-14
U-238+D1	Ra-226+D	1.317E-06	2.186E-21	3.237E-20	3.669E-19	8.763E-18	1.595E-16	2.144E-15	6.166E-15	6.359E-15
U-238+D1	Pb-210+D2	1.317E-06	1.916E-24	5.836E-23	1.414E-21	9.598E-20	4.569E-18	1.465E-16	6.247E-16	6.787E-16
U-238+D1	ΣDSR(j)		9.553E-08	9.344E-08	8.940E-08	7.657E-08	4.918E-08	1.045E-08	1.249E-10	2.534E-14
0U-238+D1	U-238+D1	1.896E-08	1.375E-09	1.345E-09	1.287E-09	1.102E-09	7.079E-10	1.504E-10	1.797E-12	3.345E-19
U-238+D1	U-234	1.896E-08	6.732E-16	1.980E-15	4.423E-15	1.137E-14	2.122E-14	1.485E-14	5.314E-16	3.315E-22
U-238+D1	Th-230	1.896E-08	2.178E-20	1.505E-19	7.733E-19	6.250E-18	3.968E-17	1.755E-16	2.655E-16	2.631E-16
U-238+D1	Ra-226+D	1.896E-08	3.146E-23	4.659E-22	5.281E-21	1.261E-19	2.295E-18	3.086E-17	8.875E-17	9.153E-17
U-238+D1	Pb-210+D3	1.896E-08	3.839E-26	1.169E-24	2.833E-23	1.923E-21	9.153E-20	2.935E-18	1.251E-17	1.357E-17
U-238+D1	ΣDSR(j)		1.375E-09	1.345E-09	1.287E-09	1.102E-09	7.079E-10	1.504E-10	1.798E-12	3.685E-16
0U-238+D1	U-238+D1	2.096E-04	1.520E-05	1.487E-05	1.422E-05	1.218E-05	7.826E-06	1.662E-06	1.987E-08	3.698E-15
U-238+D1	U-234	2.096E-04	7.442E-12	2.189E-11	4.890E-11	1.257E-10	2.346E-10	1.642E-10	5.875E-12	3.665E-18
U-238+D1	Th-230	2.096E-04	2.407E-16	1.664E-15	8.548E-15	6.909E-14	4.387E-13	1.940E-12	2.936E-12	2.908E-12
U-238+D1	Ra-226+D1	2.096E-04	8.626E-19	1.277E-17	1.448E-16	3.458E-15	6.292E-14	8.461E-13	2.432E-12	2.505E-12
U-238+D1	Pb-210+D1	2.096E-04	1.241E-21	3.779E-20	9.157E-19	6.215E-17	2.959E-15	9.488E-14	4.045E-13	4.395E-13
U-238+D1	ΣDSR(j)		1.520E-05	1.487E-05	1.422E-05	1.218E-05	7.826E-06	1.662E-06	1.988E-08	5.857E-12
0U-238+D1	U-238+D1	2.767E-10	2.007E-11	1.963E-11	1.878E-11	1.608E-11	1.033E-11	2.194E-12	2.622E-14	4.882E-21
U-238+D1	U-234	2.767E-10	9.823E-18	2.890E-17	6.455E-17	1.659E-16	3.096E-16	2.168E-16	7.755E-18	4.837E-24
U-238+D1	Th-230	2.767E-10	3.178E-22	2.196E-21	1.128E-20	9.120E-20	5.791E-19	2.560E-18	3.875E-18	3.839E-18
U-238+D1	Ra-226+D1	2.767E-10	1.139E-24	1.686E-23	1.911E-22	4.565E-21	8.305E-20	1.117E-18	3.211E-18	3.307E-18
U-238+D1	Pb-210+D2	2.767E-10	4.025E-28	1.226E-26	2.970E-25	2.016E-23	9.597E-22	3.078E-20	1.312E-19	1.426E-19
U-238+D1	ΣDSR(j)		2.007E-11	1.963E-11	1.878E-11	1.608E-11	1.033E-11	2.194E-12	2.624E-14	7.293E-18

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 34
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	3.983E-12	2.888E-13	2.825E-13	2.703E-13	2.315E-13	1.487E-13	3.158E-14	3.775E-16	7.027E-23
U-238+D1	U-234	3.983E-12	1.414E-19	4.159E-19	9.291E-19	2.388E-18	4.457E-18	3.120E-18	1.116E-19	6.963E-26
U-238+D1	Th-230	3.983E-12	4.574E-24	3.162E-23	1.624E-22	1.313E-21	8.335E-21	3.685E-20	5.578E-20	5.526E-20
U-238+D1	Ra-226+D1	3.983E-12	1.639E-26	2.427E-25	2.751E-24	6.570E-23	1.195E-21	1.608E-20	4.621E-20	4.760E-20
U-238+D1	Pb-210+D3	3.983E-12	8.063E-30	2.456E-28	5.950E-27	4.039E-25	1.923E-23	6.165E-22	2.628E-21	2.851E-21
U-238+D1	ΣDSR(j)		2.888E-13	2.825E-13	2.703E-13	2.315E-13	1.487E-13	3.158E-14	3.777E-16	1.058E-19
0U-238+D1	U-238+D1	1.994E-04	1.446E-05	1.415E-05	1.353E-05	1.159E-05	7.445E-06	1.581E-06	1.890E-08	3.519E-15
U-238+D1	U-234	1.994E-04	7.080E-12	2.083E-11	4.652E-11	1.196E-10	2.232E-10	1.562E-10	5.590E-12	3.487E-18
U-238+D1	Th-230	1.994E-04	2.290E-16	1.583E-15	8.133E-15	6.573E-14	4.174E-13	1.845E-12	2.793E-12	2.767E-12
U-238+D1	Ra-226+D2	1.994E-04	2.929E-19	4.337E-18	4.915E-17	1.174E-15	2.136E-14	2.873E-13	8.257E-13	8.501E-13
U-238+D1	Pb-210+D1	1.994E-04	1.181E-21	3.596E-20	8.712E-19	5.913E-17	2.815E-15	9.027E-14	3.848E-13	4.181E-13
U-238+D1	ΣDSR(j)		1.446E-05	1.415E-05	1.353E-05	1.159E-05	7.446E-06	1.582E-06	1.891E-08	4.039E-12
0U-238+D1	U-238+D1	2.633E-10	1.909E-11	1.867E-11	1.786E-11	1.530E-11	9.828E-12	2.087E-12	2.495E-14	4.645E-21
U-238+D1	U-234	2.633E-10	9.346E-18	2.749E-17	6.141E-17	1.579E-16	2.946E-16	2.062E-16	7.378E-18	4.602E-24
U-238+D1	Th-230	2.633E-10	3.023E-22	2.090E-21	1.074E-20	8.677E-20	5.510E-19	2.436E-18	3.687E-18	3.652E-18
U-238+D1	Ra-226+D2	2.633E-10	3.866E-25	5.725E-24	6.488E-23	1.550E-21	2.820E-20	3.792E-19	1.090E-18	1.122E-18
U-238+D1	Pb-210+D2	2.633E-10	3.830E-28	1.166E-26	2.826E-25	1.918E-23	9.131E-22	2.928E-20	1.248E-19	1.356E-19
U-238+D1	ΣDSR(j)		1.909E-11	1.867E-11	1.786E-11	1.530E-11	9.828E-12	2.088E-12	2.496E-14	4.915E-18
0U-238+D1	U-238+D1	3.789E-12	2.748E-13	2.688E-13	2.571E-13	2.202E-13	1.415E-13	3.005E-14	3.591E-16	6.685E-23
U-238+D1	U-234	3.789E-12	1.345E-19	3.957E-19	8.840E-19	2.272E-18	4.240E-18	2.969E-18	1.062E-19	6.625E-26
U-238+D1	Th-230	3.789E-12	4.352E-24	3.008E-23	1.545E-22	1.249E-21	7.931E-21	3.506E-20	5.307E-20	5.257E-20
U-238+D1	Ra-226+D2	3.789E-12	5.565E-27	8.240E-26	9.339E-25	2.231E-23	4.059E-22	5.458E-21	1.569E-20	1.615E-20
U-238+D1	Pb-210+D3	3.789E-12	7.672E-30	2.336E-28	5.661E-27	3.842E-25	1.829E-23	5.866E-22	2.500E-21	2.712E-21
U-238+D1	ΣDSR(j)		2.748E-13	2.688E-13	2.571E-13	2.202E-13	1.415E-13	3.005E-14	3.593E-16	7.150E-20
0U-238+D1	U-238+D1	4.189E-08	3.038E-09	2.971E-09	2.843E-09	2.435E-09	1.564E-09	3.322E-10	3.970E-12	7.391E-19
U-238+D1	U-234	4.189E-08	1.487E-15	4.375E-15	9.772E-15	2.512E-14	4.688E-14	3.282E-14	1.174E-15	7.324E-22
U-238+D1	Th-230	4.189E-08	4.811E-20	3.325E-19	1.708E-18	1.381E-17	8.767E-17	3.876E-16	5.866E-16	5.812E-16
U-238+D1	Ra-226+D3	4.189E-08	1.644E-22	2.434E-21	2.759E-20	6.590E-19	1.199E-17	1.612E-16	4.634E-16	4.770E-16
U-238+D1	Pb-210+D1	4.189E-08	2.480E-25	7.552E-24	1.830E-22	1.242E-20	5.913E-19	1.896E-17	8.084E-17	8.783E-17
U-238+D1	ΣDSR(j)		3.038E-09	2.971E-09	2.843E-09	2.435E-09	1.564E-09	3.322E-10	3.972E-12	1.147E-15
0U-238+D1	U-238+D1	5.530E-14	4.010E-15	3.922E-15	3.752E-15	3.214E-15	2.064E-15	4.384E-16	5.241E-18	9.756E-25
U-238+D1	U-234	5.530E-14	1.963E-21	5.774E-21	1.290E-20	3.316E-20	6.188E-20	4.332E-20	1.550E-21	9.667E-28
U-238+D1	Th-230	5.530E-14	6.350E-26	4.389E-25	2.255E-24	1.823E-23	1.157E-22	5.117E-22	7.744E-22	7.671E-22
U-238+D1	Ra-226+D3	5.530E-14	2.170E-28	3.213E-27	3.642E-26	8.699E-25	1.583E-23	2.128E-22	6.117E-22	6.297E-22
U-238+D1	Pb-210+D2	5.530E-14	8.044E-32	2.450E-30	5.936E-29	4.029E-27	1.918E-25	6.150E-24	2.622E-23	2.849E-23
U-238+D1	ΣDSR(j)		4.010E-15	3.922E-15	3.752E-15	3.214E-15	2.064E-15	4.385E-16	5.243E-18	1.426E-21

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 35
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0 Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238+D1	U-238+D1	7.959E-16	5.772E-17	5.646E-17	5.401E-17	4.626E-17	2.971E-17	6.311E-18	7.543E-20	1.404E-26
U-238+D1	U-234	7.959E-16	2.826E-23	8.312E-23	1.857E-22	4.773E-22	8.906E-22	6.235E-22	2.231E-23	1.391E-29
U-238+D1	Th-230	7.959E-16	9.141E-28	6.318E-27	3.246E-26	2.623E-25	1.666E-24	7.365E-24	1.115E-23	1.104E-23
U-238+D1	Ra-226+D3	7.959E-16	3.123E-30	4.625E-29	5.242E-28	1.252E-26	2.278E-25	3.063E-24	8.805E-24	9.064E-24
U-238+D1	Pb-210+D3	7.959E-16	1.611E-33	4.908E-32	1.189E-30	8.071E-29	3.842E-27	1.232E-25	5.251E-25	5.697E-25
U-238+D1	ΣDSR(j)		5.772E-17	5.646E-17	5.401E-17	4.626E-17	2.971E-17	6.312E-18	7.547E-20	2.069E-23
0U-238+D1	U-238+D1	1.997E-07	1.448E-08	1.416E-08	1.355E-08	1.161E-08	7.455E-09	1.583E-09	1.892E-11	3.523E-18
U-238+D1	U-234	1.997E-07	7.089E-15	2.085E-14	4.658E-14	1.197E-13	2.234E-13	1.564E-13	5.596E-15	3.491E-21
U-238+D1	Th-230	1.997E-07	2.293E-19	1.585E-18	8.143E-18	6.581E-17	4.179E-16	1.848E-15	2.796E-15	2.770E-15
U-238+D1	Ra-226+D4	1.997E-07	2.709E-23	4.012E-22	4.547E-21	1.086E-19	1.977E-18	2.662E-17	7.683E-17	8.074E-17
U-238+D1	Pb-210+D1	1.997E-07	1.182E-24	3.600E-23	8.723E-22	5.921E-20	2.818E-18	9.038E-17	3.853E-16	4.186E-16
U-238+D1	ΣDSR(j)		1.448E-08	1.416E-08	1.355E-08	1.161E-08	7.455E-09	1.583E-09	1.893E-11	3.273E-15
0U-238+D1	U-238+D1	2.636E-13	1.911E-14	1.870E-14	1.789E-14	1.532E-14	9.840E-15	2.090E-15	2.498E-17	4.650E-24
U-238+D1	U-234	2.636E-13	9.357E-21	2.752E-20	6.149E-20	1.580E-19	2.949E-19	2.065E-19	7.387E-21	4.608E-27
U-238+D1	Th-230	2.636E-13	3.027E-25	2.092E-24	1.075E-23	8.687E-23	5.516E-22	2.439E-21	3.691E-21	3.657E-21
U-238+D1	Ra-226+D4	2.636E-13	3.577E-29	5.296E-28	6.003E-27	1.434E-25	2.610E-24	3.514E-23	1.014E-22	1.066E-22
U-238+D1	Pb-210+D2	2.636E-13	3.834E-31	1.168E-29	2.829E-28	1.920E-26	9.142E-25	2.932E-23	1.250E-22	1.358E-22
U-238+D1	ΣDSR(j)		1.911E-14	1.870E-14	1.789E-14	1.532E-14	9.840E-15	2.090E-15	2.499E-17	3.904E-21
0U-238+D1	U-238+D1	3.794E-15	2.751E-16	2.691E-16	2.575E-16	2.205E-16	1.416E-16	3.008E-17	3.596E-19	6.693E-26
U-238+D1	U-234	3.794E-15	1.347E-22	3.962E-22	8.850E-22	2.275E-21	4.245E-21	2.972E-21	1.063E-22	6.633E-29
U-238+D1	Th-230	3.794E-15	4.357E-27	3.012E-26	1.547E-25	1.250E-24	7.940E-24	3.511E-23	5.313E-23	5.263E-23
U-238+D1	Ra-226+D4	3.794E-15	5.148E-31	7.623E-30	8.640E-29	2.064E-27	3.757E-26	5.058E-25	1.460E-24	1.534E-24
U-238+D1	Pb-210+D3	3.794E-15	7.681E-33	2.339E-31	5.668E-30	3.847E-28	1.831E-26	5.873E-25	2.503E-24	2.715E-24
U-238+D1	ΣDSR(j)		2.751E-16	2.691E-16	2.575E-16	2.205E-16	1.416E-16	3.009E-17	3.597E-19	5.695E-23

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

0Nuclide

(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.756E+01	1.915E+01	2.278E+01	4.183E+01	2.374E+02	1.034E+05	3.582E+12	*7.232E+13
Pa-231	4.143E+01	3.948E+01	3.675E+01	3.329E+01	4.036E+01	1.757E+02	1.473E+04	*4.723E+10
Pb-210	1.241E+01	1.295E+01	1.409E+01	1.895E+01	4.416E+01	8.536E+02	4.039E+06	*7.632E+13
Ra-226	6.969E+00	6.962E+00	6.965E+00	7.104E+00	8.318E+00	2.184E+01	5.487E+02	4.859E+07
Ra-228	6.865E+00	6.333E+00	6.501E+00	1.296E+01	1.871E+02	2.618E+06	*2.726E+14	*2.726E+14
Th-228	9.191E+00	1.321E+01	2.728E+01	3.454E+02	4.877E+05	*8.201E+14	*8.201E+14	*8.201E+14
Th-230	9.289E+01	9.236E+01	9.132E+01	8.787E+01	7.992E+01	6.717E+01	6.257E+01	6.389E+01
Th-232	4.859E+01	2.563E+01	1.297E+01	5.725E+00	4.156E+00	4.085E+00	4.113E+00	4.228E+00
U-234	9.904E+02	1.012E+03	1.058E+03	1.234E+03	1.915E+03	8.653E+03	1.263E+05	1.536E+05
U-235	9.496E+01	9.708E+01	1.015E+02	1.184E+02	1.840E+02	8.596E+02	7.036E+04	*2.160E+06
U-238	3.259E+02	3.332E+02	3.483E+02	4.066E+02	6.330E+02	2.980E+03	2.493E+05	*3.361E+05

*At specific activity limit
0

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 304.1 ± 0.6 years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	7.000E-03	0.000E+00	1.424E+00	1.756E+01	4.906E-12	5.095E+12
Pa-231	1.400E-02	11.52 ± 0.02	7.528E-01	3.321E+01	1.551E-03	1.612E+04
Pb-210	8.000E-03	0.000E+00	0.000E+00	*7.632E+13	5.213E-06	4.796E+06
Pb-210	8.000E-03	0.000E+00	2.015E+00	1.241E+01	5.213E-06	4.796E+06
Ra-226	7.000E-03	1.747 ± 0.003	3.591E+00	6.961E+00	4.265E-02	5.861E+02
Ra-228	3.600E-04	1.636 ± 0.003	3.992E+00	6.262E+00	7.814E-18	*2.726E+14
Th-228	1.000E-03	0.000E+00	2.720E+00	9.191E+00	0.000E+00	*8.201E+14
Th-230	1.000E+00	326.0 ± 0.7	3.996E-01	6.256E+01	3.995E-01	6.257E+01
Th-232	1.000E-03	62.2 ± 0.1	6.125E+00	4.081E+00	6.078E+00	4.113E+00
U-234	1.200E-02	0.000E+00	2.524E-02	9.904E+02	1.952E-04	1.281E+05
U-235	5.200E-04	0.000E+00	2.633E-01	9.496E+01	3.249E-04	7.694E+04
U-238	1.200E-02	0.000E+00	7.671E-02	3.259E+02	9.168E-05	2.727E+05

*At specific activity limit

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	9.816E-03	9.000E-03	7.565E-03	4.120E-03	7.260E-04	1.667E-06	4.811E-14	0.000E+00
Ac-227	Ac-227	2.722E-03	2.730E-05	2.503E-05	2.104E-05	1.146E-05	2.019E-06	4.637E-09	1.338E-16	0.000E+00
Ac-227	Pa-231	9.835E-01	3.147E-04	8.998E-04	1.889E-03	3.941E-03	4.421E-03	1.088E-03	1.298E-05	2.393E-12
Ac-227	U-235	9.835E-01	8.272E-11	5.579E-10	2.712E-09	1.809E-08	6.938E-08	7.290E-08	2.917E-09	1.872E-15
Ac-227	ΣDOSE(j)		1.016E-02	9.925E-03	9.476E-03	8.072E-03	5.149E-03	1.090E-03	1.298E-05	2.395E-12
0Ac-227	Ac-227	1.376E-02	1.237E-04	1.134E-04	9.532E-05	5.192E-05	9.148E-06	2.101E-08	6.061E-16	0.000E+00
Ac-227	Ac-227	3.809E-05	3.442E-07	3.156E-07	2.653E-07	1.445E-07	2.546E-08	5.846E-11	1.687E-18	0.000E+00
Ac-227	Pa-231	1.376E-02	3.965E-06	1.134E-05	2.380E-05	4.965E-05	5.570E-05	1.371E-05	1.636E-07	3.016E-14
Ac-227	U-235	1.376E-02	1.042E-12	7.030E-12	3.418E-11	2.280E-10	8.741E-10	9.185E-10	3.675E-11	2.359E-17
Ac-227	ΣDOSE(j)		1.280E-04	1.250E-04	1.194E-04	1.017E-04	6.488E-05	1.373E-05	1.636E-07	3.018E-14
0Ac-227	Ac-227	8.257E-07	6.532E-09	5.989E-09	5.034E-09	2.742E-09	4.831E-10	1.109E-12	3.198E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.819E-11	1.668E-11	1.402E-11	7.635E-12	1.345E-12	3.089E-15	8.906E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	2.094E-10	5.987E-10	1.257E-09	2.622E-09	2.941E-09	7.237E-10	8.630E-12	1.585E-18
Ac-227	U-235	8.257E-07	5.504E-17	3.713E-16	1.805E-15	1.204E-14	4.616E-14	4.849E-14	1.939E-15	1.240E-21
Ac-227	ΣDOSE(j)		6.759E-09	6.604E-09	6.305E-09	5.371E-09	3.426E-09	7.249E-10	8.632E-12	1.586E-18
0Pa-231	Pa-231	9.835E-01	7.994E-03	7.819E-03	7.480E-03	6.406E-03	4.113E-03	8.727E-04	1.040E-05	1.921E-12
Pa-231	Pa-231	2.722E-03	2.213E-05	2.164E-05	2.070E-05	1.773E-05	1.138E-05	2.415E-06	2.878E-08	5.317E-15
Pa-231	U-235	9.835E-01	3.130E-09	9.206E-09	2.057E-08	5.286E-08	9.862E-08	6.900E-08	2.464E-09	1.527E-15
Pa-231	U-235	2.722E-03	8.662E-12	2.548E-11	5.692E-11	1.463E-10	2.730E-10	1.910E-10	6.819E-12	4.225E-18
Pa-231	U-235	1.376E-02	4.379E-11	1.288E-10	2.878E-10	7.396E-10	1.380E-09	9.655E-10	3.448E-11	2.136E-17
Pa-231	U-235	3.809E-05	1.212E-13	3.565E-13	7.964E-13	2.047E-12	3.819E-12	2.672E-12	9.542E-14	5.912E-20
Pa-231	U-235	8.257E-07	2.628E-15	7.729E-15	1.727E-14	4.438E-14	8.280E-14	5.793E-14	2.069E-15	1.282E-21
Pa-231	U-235	2.285E-09	7.272E-18	2.139E-17	4.779E-17	1.228E-16	2.292E-16	1.603E-16	5.725E-18	3.547E-24
Pa-231	ΣDOSE(j)		8.016E-03	7.841E-03	7.501E-03	6.424E-03	4.125E-03	8.752E-04	1.043E-05	1.928E-12
0Ac-227	Pa-231	2.722E-03	8.752E-07	2.503E-06	5.255E-06	1.096E-05	1.230E-05	3.026E-06	3.611E-08	6.656E-15
Ac-227	U-235	2.722E-03	2.301E-13	1.552E-12	7.544E-12	5.032E-11	1.930E-10	2.027E-10	8.112E-12	5.207E-18
Ac-227	ΣDOSE(j)		8.752E-07	2.503E-06	5.255E-06	1.096E-05	1.230E-05	3.026E-06	3.611E-08	6.661E-15
0Pa-231	Pa-231	1.376E-02	1.119E-04	1.094E-04	1.047E-04	8.964E-05	5.756E-05	1.221E-05	1.455E-07	2.688E-14
Pa-231	Pa-231	3.809E-05	3.096E-07	3.028E-07	2.897E-07	2.481E-07	1.593E-07	3.380E-08	4.028E-10	7.440E-17
Pa-231	ΣDOSE(j)		1.122E-04	1.097E-04	1.050E-04	8.988E-05	5.772E-05	1.225E-05	1.459E-07	2.695E-14
0Ac-227	Pa-231	3.809E-05	1.103E-08	3.155E-08	6.624E-08	1.382E-07	1.550E-07	3.814E-08	4.551E-10	8.391E-17
Ac-227	U-235	3.809E-05	2.900E-15	1.956E-14	9.510E-14	6.344E-13	2.433E-12	2.556E-12	1.023E-13	6.564E-20
Ac-227	ΣDOSE(j)		1.103E-08	3.155E-08	6.624E-08	1.382E-07	1.550E-07	3.815E-08	4.552E-10	8.397E-17
0Pa-231	Pa-231	8.257E-07	6.712E-09	6.565E-09	6.280E-09	5.378E-09	3.454E-09	7.327E-10	8.732E-12	1.613E-18
Pa-231	Pa-231	2.285E-09	1.858E-11	1.817E-11	1.738E-11	1.489E-11	9.558E-12	2.028E-12	2.417E-14	4.464E-21
Pa-231	ΣDOSE(j)		6.730E-09	6.583E-09	6.298E-09	5.393E-09	3.463E-09	7.347E-10	8.756E-12	1.617E-18
0Ac-227	Pa-231	2.285E-09	5.831E-13	1.667E-12	3.501E-12	7.302E-12	8.192E-12	2.015E-12	2.403E-14	4.414E-21
Ac-227	U-235	2.285E-09	1.533E-19	1.034E-18	5.026E-18	3.353E-17	1.286E-16	1.350E-16	5.400E-18	3.453E-24
Ac-227	ΣDOSE(j)		5.831E-13	1.667E-12	3.501E-12	7.302E-12	8.192E-12	2.016E-12	2.404E-14	4.418E-21
0Pb-210	Pb-210	1.000E+00	1.612E-02	1.545E-02	1.420E-02	1.056E-02	4.529E-03	2.343E-04	4.952E-08	6.795E-21

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		1.612E-02	1.545E-02	1.420E-02	1.056E-02	4.529E-03	2.343E-04	4.952E-08	6.795E-21
0Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06	7.149E-11	2.090E-10	4.605E-10	1.129E-09	1.869E-09	1.013E-09	4.227E-11	4.827E-16
Pb-210	Ra-226	2.771E-10	1.502E-14	4.390E-14	9.672E-14	2.371E-13	3.925E-13	2.127E-13	8.878E-15	1.014E-19
Pb-210	Ra-226	2.637E-10	1.429E-14	4.176E-14	9.202E-14	2.256E-13	3.734E-13	2.024E-13	8.447E-15	9.647E-20
Pb-210	Ra-226	5.538E-14	3.001E-18	8.772E-18	1.933E-17	4.739E-17	7.843E-17	4.250E-17	1.774E-18	2.026E-23
Pb-210	Ra-226	2.640E-13	1.430E-17	4.181E-17	9.213E-17	2.259E-16	3.739E-16	2.026E-16	8.457E-18	9.659E-23
Pb-210	Th-230	1.319E-06	1.482E-12	1.020E-11	5.195E-11	4.071E-10	2.394E-09	9.064E-09	1.288E-08	1.279E-08
Pb-210	Th-230	2.771E-10	3.113E-16	2.143E-15	1.091E-14	8.550E-14	5.029E-13	1.904E-12	2.705E-12	2.686E-12
Pb-210	Th-230	2.637E-10	2.962E-16	2.039E-15	1.038E-14	8.135E-14	4.785E-13	1.811E-12	2.574E-12	2.556E-12
Pb-210	Th-230	5.538E-14	6.221E-20	4.283E-19	2.180E-18	1.709E-17	1.005E-16	3.805E-16	5.406E-16	5.369E-16
Pb-210	Th-230	2.640E-13	2.965E-19	2.041E-18	1.039E-17	8.145E-17	4.791E-16	1.814E-15	2.577E-15	2.559E-15
Pb-210	U-234	1.319E-06	4.082E-20	6.019E-19	6.758E-18	1.561E-16	2.599E-15	2.768E-14	6.256E-14	6.385E-14
Pb-210	U-234	2.771E-10	8.575E-24	1.264E-22	1.419E-21	3.279E-20	5.458E-19	5.815E-18	1.314E-17	1.341E-17
Pb-210	U-234	2.637E-10	8.158E-24	1.203E-22	1.350E-21	3.119E-20	5.193E-19	5.532E-18	1.250E-17	1.276E-17
Pb-210	U-234	5.538E-14	1.714E-27	2.527E-26	2.836E-25	6.552E-24	1.091E-22	1.162E-21	2.626E-21	2.680E-21
Pb-210	U-234	2.640E-13	8.168E-27	1.204E-25	1.352E-24	3.123E-23	5.199E-22	5.539E-21	1.252E-20	1.278E-20
Pb-210	U-238	2.111E-09	3.685E-29	1.122E-27	2.719E-26	1.846E-24	8.787E-23	2.818E-21	1.201E-20	1.305E-20
Pb-210	U-238	4.434E-13	0.000E+00	2.317E-31	5.712E-30	3.877E-28	1.846E-26	5.919E-25	2.523E-24	2.741E-24
Pb-210	U-238	4.219E-13	0.000E+00	2.204E-31	5.435E-30	3.689E-28	1.756E-26	5.631E-25	2.401E-24	2.608E-24
Pb-210	U-238	8.862E-17	0.000E+00	0.000E+00	0.000E+00	7.615E-32	3.688E-30	1.183E-28	5.042E-28	5.479E-28
Pb-210	U-238	4.224E-16	0.000E+00	0.000E+00	0.000E+00	3.630E-31	1.758E-29	5.638E-28	2.404E-27	2.611E-27
Pb-210	U-238	1.317E-06	2.300E-26	7.003E-25	1.697E-23	1.152E-21	5.483E-20	1.758E-18	7.496E-18	8.144E-18
Pb-210	U-238	2.767E-10	4.830E-30	1.471E-28	3.564E-27	2.419E-25	1.152E-23	3.693E-22	1.574E-21	1.711E-21
Pb-210	U-238	2.633E-10	4.595E-30	1.400E-28	3.391E-27	2.302E-25	1.096E-23	3.514E-22	1.498E-21	1.628E-21
Pb-210	U-238	5.530E-14	0.000E+00	2.889E-32	7.001E-31	4.835E-29	2.301E-27	7.381E-26	3.146E-25	3.419E-25
Pb-210	U-238	2.636E-13	0.000E+00	1.377E-31	3.395E-30	2.304E-28	1.097E-26	3.518E-25	1.500E-24	1.630E-24
Pb-210	ΣDOSE(j)		7.301E-11	2.193E-10	5.126E-10	1.537E-09	4.265E-09	1.008E-08	1.293E-08	1.280E-08
0Ra-226	Ra-226	9.996E-01	2.487E-02	2.447E-02	2.369E-02	2.114E-02	1.527E-02	4.886E-03	1.885E-04	2.111E-09
Ra-226	Ra-226	1.319E-06	3.283E-08	3.230E-08	3.127E-08	2.790E-08	2.015E-08	6.450E-09	2.488E-10	2.787E-15
Ra-226	Th-230	9.996E-01	7.718E-04	2.299E-03	5.279E-03	1.498E-02	3.729E-02	7.657E-02	9.361E-02	9.078E-02
Ra-226	Th-230	1.319E-06	1.019E-09	3.034E-09	6.968E-09	1.977E-08	4.922E-08	1.011E-07	1.236E-07	1.198E-07
Ra-226	Th-230	1.899E-08	1.466E-11	4.368E-11	1.003E-10	2.845E-10	7.084E-10	1.455E-09	1.779E-09	1.725E-09
Ra-226	U-234	9.996E-01	2.827E-11	1.957E-10	1.009E-09	8.266E-09	5.444E-08	2.677E-07	4.591E-07	4.532E-07
Ra-226	U-234	1.319E-06	3.732E-17	2.584E-16	1.332E-15	1.091E-14	7.186E-14	3.533E-13	6.060E-13	5.982E-13
Ra-226	U-234	1.899E-08	5.371E-19	3.719E-18	1.918E-17	1.571E-16	1.034E-15	5.086E-15	8.723E-15	8.611E-15
Ra-226	U-238	1.599E-03	3.185E-20	4.716E-19	5.345E-18	1.277E-16	2.323E-15	3.124E-14	8.983E-14	9.264E-14
Ra-226	U-238	2.111E-09	4.204E-26	6.225E-25	7.055E-24	1.685E-22	3.066E-21	4.124E-20	1.186E-19	1.223E-19
Ra-226	U-238	3.039E-11	6.051E-28	8.960E-27	1.015E-25	2.426E-24	4.414E-23	5.935E-22	1.707E-21	1.760E-21
Ra-226	U-238	9.980E-01	1.987E-17	2.943E-16	3.335E-15	7.967E-14	1.450E-12	1.949E-11	5.605E-11	5.781E-11
Ra-226	U-238	1.317E-06	2.623E-23	3.884E-22	4.402E-21	1.052E-19	1.913E-18	2.573E-17	7.399E-17	7.631E-17
Ra-226	U-238	1.896E-08	3.776E-25	5.591E-24	6.337E-23	1.514E-21	2.754E-20	3.704E-19	1.065E-18	1.098E-18
Ra-226	ΣDOSE(j)		2.565E-02	2.677E-02	2.897E-02	3.611E-02	5.255E-02	8.146E-02	9.380E-02	9.078E-02
0Pb-210	Ra-226	9.996E-01	2.204E-04	6.443E-04	1.420E-03	3.481E-03	5.761E-03	3.122E-03	1.303E-04	1.488E-09

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	4.630E-08	1.353E-07	2.982E-07	7.311E-07	1.210E-06	6.557E-07	2.737E-08	3.126E-13
Pb-210	Ra-226	1.998E-04	4.405E-08	1.288E-07	2.837E-07	6.956E-07	1.151E-06	6.239E-07	2.604E-08	2.974E-13
Pb-210	Ra-226	4.196E-08	9.252E-12	2.704E-11	5.959E-11	1.461E-10	2.418E-10	1.310E-10	5.470E-12	6.247E-17
Pb-210	Ra-226	2.000E-07	4.410E-11	1.289E-10	2.840E-10	6.964E-10	1.153E-09	6.246E-10	2.607E-11	2.978E-16
Pb-210	Th-230	9.996E-01	4.569E-06	3.146E-05	1.601E-04	1.255E-03	7.382E-03	2.794E-02	3.970E-02	3.943E-02
Pb-210	Th-230	2.100E-04	9.597E-10	6.607E-09	3.364E-08	2.636E-07	1.551E-06	5.869E-06	8.340E-06	8.282E-06
Pb-210	Th-230	1.998E-04	9.131E-10	6.286E-09	3.200E-08	2.508E-07	1.475E-06	5.584E-06	7.934E-06	7.879E-06
Pb-210	Th-230	4.196E-08	1.918E-13	1.320E-12	6.722E-12	5.268E-11	3.099E-10	1.173E-09	1.667E-09	1.655E-09
Pb-210	Th-230	2.000E-07	9.142E-13	6.294E-12	3.204E-11	2.511E-10	1.477E-09	5.591E-09	7.944E-09	7.889E-09
Pb-210	U-234	9.996E-01	1.259E-13	1.856E-12	2.083E-11	4.812E-10	8.012E-09	8.534E-08	1.929E-07	1.968E-07
Pb-210	U-234	2.100E-04	2.644E-17	3.898E-16	4.376E-15	1.011E-13	1.683E-12	1.793E-11	4.051E-11	4.135E-11
Pb-210	U-234	1.998E-04	2.515E-17	3.708E-16	4.163E-15	9.617E-14	1.601E-12	1.706E-11	3.854E-11	3.934E-11
Pb-210	U-234	4.196E-08	5.283E-21	7.789E-20	8.745E-19	2.020E-17	3.363E-16	3.582E-15	8.096E-15	8.263E-15
Pb-210	U-234	2.000E-07	2.518E-20	3.713E-19	4.168E-18	9.629E-17	1.603E-15	1.708E-14	3.859E-14	3.938E-14
Pb-210	U-238	1.599E-03	1.136E-22	3.460E-21	8.384E-20	5.691E-18	2.709E-16	8.687E-15	3.703E-14	4.024E-14
Pb-210	U-238	3.359E-07	2.386E-26	7.268E-25	1.761E-23	1.195E-21	5.690E-20	1.825E-18	7.779E-18	8.452E-18
Pb-210	U-238	3.196E-07	2.270E-26	6.915E-25	1.675E-23	1.137E-21	5.413E-20	1.736E-18	7.401E-18	8.041E-18
Pb-210	U-238	6.713E-11	4.754E-30	1.452E-28	3.519E-27	2.389E-25	1.137E-23	3.646E-22	1.555E-21	1.689E-21
Pb-210	U-238	3.200E-10	2.273E-29	6.923E-28	1.677E-26	1.139E-24	5.420E-23	1.738E-21	7.410E-21	8.051E-21
Pb-210	U-238	9.980E-01	7.090E-20	2.159E-18	5.232E-17	3.551E-15	1.690E-13	5.421E-12	2.311E-11	2.511E-11
Pb-210	U-238	2.096E-04	1.489E-23	4.535E-22	1.099E-20	7.458E-19	3.550E-17	1.139E-15	4.854E-15	5.274E-15
Pb-210	U-238	1.994E-04	1.417E-23	4.315E-22	1.045E-20	7.096E-19	3.378E-17	1.083E-15	4.618E-15	5.018E-15
Pb-210	U-238	4.189E-08	2.976E-27	9.063E-26	2.196E-24	1.490E-22	7.095E-21	2.275E-19	9.700E-19	1.054E-18
Pb-210	U-238	1.997E-07	1.418E-26	4.320E-25	1.047E-23	7.105E-22	3.382E-20	1.085E-18	4.624E-18	5.024E-18
Pb-210	ΣDOSE(j)		2.251E-04	6.760E-04	1.580E-03	4.737E-03	1.315E-02	3.108E-02	3.985E-02	3.945E-02
0Ra-226	Ra-226	1.899E-08	4.726E-10	4.650E-10	4.501E-10	4.016E-10	2.901E-10	9.284E-11	3.581E-12	4.011E-17
Ra-226	Ra-226	2.100E-04	1.296E-05	1.275E-05	1.234E-05	1.101E-05	7.952E-06	2.545E-06	9.814E-08	1.098E-12
Ra-226	ΣDOSE(j)		1.296E-05	1.275E-05	1.234E-05	1.101E-05	7.952E-06	2.545E-06	9.814E-08	1.098E-12
0Pb-210	Ra-226	1.899E-08	1.432E-12	4.187E-12	9.224E-12	2.262E-11	3.743E-11	2.028E-11	8.465E-13	9.653E-18
Pb-210	Ra-226	3.989E-12	3.008E-16	8.794E-16	1.937E-15	4.750E-15	7.863E-15	4.260E-15	1.778E-16	2.028E-21
Pb-210	Ra-226	3.795E-12	2.862E-16	8.366E-16	1.843E-15	4.520E-15	7.481E-15	4.054E-15	1.692E-16	1.929E-21
Pb-210	Ra-226	7.972E-16	6.012E-20	1.757E-19	3.872E-19	9.493E-19	1.571E-18	8.514E-19	3.553E-20	4.052E-25
Pb-210	Ra-226	3.800E-15	2.866E-19	8.377E-19	1.846E-18	4.525E-18	7.490E-18	4.058E-18	1.694E-19	1.931E-24
Pb-210	Th-230	1.899E-08	2.969E-14	2.044E-13	1.041E-12	8.155E-12	4.797E-11	1.816E-10	2.579E-10	2.557E-10
Pb-210	Th-230	3.989E-12	6.236E-18	4.293E-17	2.186E-16	1.713E-15	1.007E-14	3.814E-14	5.418E-14	5.372E-14
Pb-210	Th-230	3.795E-12	5.933E-18	4.085E-17	2.080E-16	1.630E-15	9.585E-15	3.628E-14	5.155E-14	5.111E-14
Pb-210	Th-230	7.972E-16	1.246E-21	8.580E-21	4.368E-20	3.423E-19	2.013E-18	7.621E-18	1.083E-17	1.074E-17
Pb-210	Th-230	3.800E-15	5.940E-21	4.090E-20	2.082E-19	1.632E-18	9.597E-18	3.633E-17	5.161E-17	5.117E-17
Pb-210	U-234	1.899E-08	8.178E-22	1.206E-20	1.354E-19	3.127E-18	5.206E-17	5.545E-16	1.253E-15	1.277E-15
Pb-210	U-234	3.989E-12	1.718E-25	2.533E-24	2.843E-23	6.568E-22	1.093E-20	1.165E-19	2.632E-19	2.682E-19
Pb-210	U-234	3.795E-12	1.634E-25	2.410E-24	2.705E-23	6.249E-22	1.040E-20	1.108E-19	2.504E-19	2.552E-19
Pb-210	U-234	7.972E-16	3.433E-29	5.061E-28	5.682E-27	1.313E-25	2.185E-24	2.328E-23	5.259E-23	5.359E-23
Pb-210	U-234	3.800E-15	1.636E-28	2.413E-27	2.709E-26	6.257E-25	1.042E-23	1.110E-22	2.507E-22	2.555E-22
Pb-210	U-238	3.039E-11	7.363E-31	2.248E-29	5.448E-28	3.698E-26	1.760E-24	5.645E-23	2.406E-22	2.610E-22
Pb-210	U-238	6.383E-15	0.000E+00	0.000E+00	1.141E-31	7.767E-30	3.697E-28	1.186E-26	5.053E-26	5.482E-26
Pb-210	U-238	6.073E-15	0.000E+00	0.000E+00	1.086E-31	7.389E-30	3.518E-28	1.128E-26	4.808E-26	5.216E-26
Pb-210	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.369E-32	2.363E-30	1.010E-29	1.096E-29

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.512E-31	1.129E-29	4.814E-29	5.222E-29
Pb-210	U-238	1.896E-08	4.607E-28	1.403E-26	3.399E-25	2.307E-23	1.098E-21	3.522E-20	1.501E-19	1.629E-19
Pb-210	U-238	3.983E-12	9.650E-32	2.939E-30	7.140E-29	4.846E-27	2.307E-25	7.398E-24	3.153E-23	3.421E-23
Pb-210	U-238	3.789E-12	9.181E-32	2.796E-30	6.793E-29	4.611E-27	2.195E-25	7.039E-24	3.000E-23	3.255E-23
Pb-210	U-238	7.959E-16	0.000E+00	0.000E+00	0.000E+00	9.659E-31	4.610E-29	1.478E-27	6.302E-27	6.836E-27
Pb-210	U-238	3.794E-15	0.000E+00	0.000E+00	6.783E-32	4.617E-30	2.198E-28	7.047E-27	3.004E-26	3.258E-26
Pb-210	ΣDOSE(j)		1.463E-12	4.393E-12	1.027E-11	3.078E-11	8.543E-11	2.019E-10	2.589E-10	2.559E-10
0Ra-226	Ra-226	2.771E-10	1.710E-11	1.683E-11	1.629E-11	1.453E-11	1.050E-11	3.359E-12	1.295E-13	1.449E-18
Ra-226	Ra-226	3.989E-12	2.462E-13	2.422E-13	2.344E-13	2.092E-13	1.511E-13	4.835E-14	1.865E-15	2.086E-20
Ra-226	ΣDOSE(j)		1.735E-11	1.707E-11	1.652E-11	1.474E-11	1.065E-11	3.408E-12	1.314E-13	1.470E-18
0Ra-226	Ra-226	1.998E-04	4.399E-06	4.328E-06	4.190E-06	3.739E-06	2.700E-06	8.641E-07	3.331E-08	3.725E-13
Ra-226	Ra-226	2.637E-10	5.807E-12	5.714E-12	5.531E-12	4.935E-12	3.564E-12	1.141E-12	4.397E-14	4.917E-19
Ra-226	Th-230	1.998E-04	1.365E-07	4.066E-07	9.336E-07	2.649E-06	6.594E-06	1.354E-05	1.655E-05	1.602E-05
Ra-226	Th-230	2.637E-10	1.802E-13	5.367E-13	1.232E-12	3.496E-12	8.704E-12	1.787E-11	2.184E-11	2.115E-11
Ra-226	Th-230	3.795E-12	2.594E-15	7.725E-15	1.774E-14	5.032E-14	1.253E-13	2.573E-13	3.144E-13	3.044E-13
Ra-226	U-234	1.998E-04	5.000E-15	3.462E-14	1.785E-13	1.462E-12	9.627E-12	4.733E-11	8.115E-11	7.997E-11
Ra-226	U-234	2.637E-10	6.600E-21	4.570E-20	2.356E-19	1.930E-18	1.271E-17	6.248E-17	1.071E-16	1.056E-16
Ra-226	U-234	3.795E-12	9.500E-23	6.577E-22	3.392E-21	2.778E-20	1.829E-19	8.993E-19	1.542E-18	1.519E-18
Ra-226	U-238	3.196E-07	5.633E-24	8.341E-23	9.453E-22	2.258E-20	4.108E-19	5.524E-18	1.588E-17	1.635E-17
Ra-226	U-238	4.219E-13	7.427E-30	1.101E-28	1.248E-27	2.981E-26	5.423E-25	7.292E-24	2.096E-23	2.158E-23
Ra-226	U-238	6.073E-15	9.756E-32	1.583E-30	1.796E-29	4.290E-28	7.806E-27	1.050E-25	3.017E-25	3.106E-25
Ra-226	U-238	1.994E-04	3.515E-21	5.204E-20	5.899E-19	1.409E-17	2.564E-16	3.447E-15	9.908E-15	1.020E-14
Ra-226	U-238	2.633E-10	4.639E-27	6.870E-26	7.786E-25	1.860E-23	3.384E-22	4.550E-21	1.308E-20	1.347E-20
Ra-226	U-238	3.789E-12	6.678E-29	9.889E-28	1.121E-26	2.677E-25	4.871E-24	6.549E-23	1.883E-22	1.938E-22
Ra-226	ΣDOSE(j)		4.536E-06	4.735E-06	5.123E-06	6.387E-06	9.294E-06	1.440E-05	1.658E-05	1.602E-05
0Ra-226	Ra-226	3.795E-12	8.359E-14	8.224E-14	7.961E-14	7.103E-14	5.130E-14	1.642E-14	6.330E-16	7.078E-21
Ra-226	Ra-226	4.196E-08	2.469E-09	2.429E-09	2.352E-09	2.098E-09	1.515E-09	4.850E-10	1.870E-11	2.091E-16
Ra-226	ΣDOSE(j)		2.469E-09	2.429E-09	2.352E-09	2.098E-09	1.515E-09	4.850E-10	1.870E-11	2.091E-16
0Ra-226	Ra-226	5.538E-14	3.259E-15	3.207E-15	3.104E-15	2.770E-15	2.000E-15	6.402E-16	2.468E-17	2.760E-22
Ra-226	Ra-226	7.972E-16	4.692E-17	4.616E-17	4.468E-17	3.987E-17	2.879E-17	9.214E-18	3.553E-19	3.972E-24
Ra-226	ΣDOSE(j)		3.306E-15	3.253E-15	3.149E-15	2.810E-15	2.029E-15	6.494E-16	2.504E-17	2.799E-22
0Ra-226	Ra-226	2.000E-07	4.070E-10	4.004E-10	3.876E-10	3.459E-10	2.499E-10	8.008E-11	3.100E-12	3.539E-17
Ra-226	Ra-226	2.640E-13	5.372E-16	5.285E-16	5.116E-16	4.566E-16	3.299E-16	1.057E-16	4.092E-18	4.671E-23
Ra-226	Th-230	2.000E-07	1.263E-11	3.761E-11	8.637E-11	2.451E-10	6.103E-10	1.255E-09	1.540E-09	1.522E-09
Ra-226	Th-230	2.640E-13	1.667E-17	4.965E-17	1.140E-16	3.235E-16	8.056E-16	1.656E-15	2.032E-15	2.008E-15
Ra-226	Th-230	3.800E-15	2.399E-19	7.146E-19	1.641E-18	4.656E-18	1.160E-17	2.384E-17	2.925E-17	2.891E-17
Ra-226	U-234	2.000E-07	4.625E-19	3.202E-18	1.651E-17	1.353E-16	8.911E-16	4.387E-15	7.552E-15	7.596E-15
Ra-226	U-234	2.640E-13	6.105E-25	4.227E-24	2.180E-23	1.785E-22	1.176E-21	5.790E-21	9.968E-21	1.003E-20
Ra-226	U-234	3.800E-15	8.788E-27	6.085E-26	3.138E-25	2.570E-24	1.693E-23	8.334E-23	1.435E-22	1.443E-22
Ra-226	U-238	3.200E-10	5.211E-28	7.716E-27	8.745E-26	2.089E-24	3.803E-23	5.120E-22	1.478E-21	1.553E-21
Ra-226	U-238	4.224E-16	0.000E+00	0.000E+00	1.091E-31	2.758E-30	5.019E-29	6.758E-28	1.950E-27	2.050E-27
Ra-226	U-238	6.080E-18	0.000E+00	0.000E+00	0.000E+00	3.750E-32	7.139E-31	9.727E-30	2.807E-29	2.950E-29
Ra-226	U-238	1.997E-07	3.251E-25	4.815E-24	5.457E-23	1.304E-21	2.373E-20	3.195E-19	9.220E-19	9.689E-19
Ra-226	U-238	2.636E-13	4.241E-31	6.355E-30	7.203E-29	1.721E-27	3.132E-26	4.217E-25	1.217E-24	1.279E-24

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	8.643E-32	1.037E-30	2.477E-29	4.508E-28	6.070E-27	1.752E-26	1.841E-26
Ra-226	ΣDOSE(j)		4.196E-10	4.380E-10	4.740E-10	5.910E-10	8.602E-10	1.335E-09	1.543E-09	1.522E-09
0Ra-226	Ra-226	3.800E-15	7.733E-18	7.608E-18	7.364E-18	6.572E-18	4.748E-18	1.521E-18	5.890E-20	6.723E-25
0Ra-228	Ra-228	1.000E+00	1.131E-03	9.871E-04	7.515E-04	2.893E-04	1.891E-05	1.351E-09	1.927E-21	0.000E+00
Ra-228	Th-232	1.000E+00	1.937E-04	5.478E-04	1.126E-03	2.261E-03	2.923E-03	2.965E-03	2.949E-03	2.888E-03
Ra-228	ΣDOSE(j)		1.325E-03	1.535E-03	1.878E-03	2.550E-03	2.942E-03	2.965E-03	2.949E-03	2.888E-03
0Th-228	Ra-228	1.000E+00	1.797E-04	4.340E-04	6.330E-04	4.054E-04	2.920E-05	2.086E-09	2.965E-21	0.000E+00
Th-228	Th-228	1.000E+00	2.720E-03	1.893E-03	9.164E-04	7.238E-05	5.126E-08	4.845E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	2.090E-05	1.276E-04	5.020E-04	1.806E-03	2.792E-03	2.855E-03	2.831E-03	2.731E-03
Th-228	ΣDOSE(j)		2.921E-03	2.454E-03	2.051E-03	2.284E-03	2.821E-03	2.855E-03	2.831E-03	2.731E-03
0Th-230	Th-230	9.996E-01	2.682E-01	2.682E-01	2.682E-01	2.682E-01	2.680E-01	2.675E-01	2.660E-01	2.609E-01
Th-230	Th-230	1.319E-06	3.541E-07	3.541E-07	3.541E-07	3.540E-07	3.538E-07	3.531E-07	3.512E-07	3.444E-07
Th-230	U-234	9.996E-01	1.469E-08	4.364E-08	9.966E-08	2.773E-07	6.562E-07	1.191E-06	1.326E-06	1.303E-06
Th-230	U-234	1.319E-06	1.939E-14	5.761E-14	1.315E-13	3.660E-13	8.661E-13	1.572E-12	1.751E-12	1.719E-12
Th-230	U-234	1.899E-08	2.791E-16	8.292E-16	1.894E-15	5.268E-15	1.247E-14	2.262E-14	2.520E-14	2.475E-14
Th-230	U-234	2.100E-04	3.086E-12	9.167E-12	2.093E-11	5.824E-11	1.378E-10	2.501E-10	2.786E-10	2.736E-10
Th-230	U-234	2.771E-10	4.073E-18	1.210E-17	2.763E-17	7.687E-17	1.819E-16	3.301E-16	3.677E-16	3.611E-16
Th-230	U-234	3.989E-12	5.863E-20	1.742E-19	3.977E-19	1.107E-18	2.619E-18	4.752E-18	5.293E-18	5.198E-18
Th-230	U-234	1.998E-04	2.936E-12	8.722E-12	1.992E-11	5.541E-11	1.311E-10	2.379E-10	2.651E-10	2.603E-10
Th-230	U-234	2.637E-10	3.875E-18	1.151E-17	2.629E-17	7.314E-17	1.731E-16	3.141E-16	3.499E-16	3.436E-16
Th-230	U-234	3.795E-12	5.578E-20	1.657E-19	3.784E-19	1.053E-18	2.491E-18	4.521E-18	5.036E-18	4.946E-18
Th-230	U-234	4.196E-08	6.167E-16	1.832E-15	4.183E-15	1.164E-14	2.754E-14	4.998E-14	5.567E-14	5.468E-14
Th-230	U-234	5.538E-14	8.140E-22	2.418E-21	5.522E-21	1.536E-20	3.636E-20	6.597E-20	7.349E-20	7.217E-20
Th-230	U-234	7.972E-16	1.172E-23	3.481E-23	7.948E-23	2.211E-22	5.233E-22	9.495E-22	1.058E-21	1.039E-21
Th-230	U-234	2.000E-07	2.939E-15	8.732E-15	1.994E-14	5.548E-14	1.313E-13	2.382E-13	2.654E-13	2.606E-13
Th-230	U-234	2.640E-13	3.880E-21	1.153E-20	2.632E-20	7.323E-20	1.733E-19	3.144E-19	3.503E-19	3.440E-19
Th-230	U-234	3.800E-15	5.585E-23	1.659E-22	3.789E-22	1.054E-21	2.494E-21	4.526E-21	5.042E-21	4.952E-21
Th-230	U-238	1.599E-03	2.204E-17	1.523E-16	7.826E-16	6.326E-15	4.017E-14	1.776E-13	2.688E-13	2.663E-13
Th-230	U-238	2.111E-09	2.909E-23	2.011E-22	1.033E-21	8.350E-21	5.302E-20	2.344E-19	3.548E-19	3.515E-19
Th-230	U-238	3.039E-11	4.188E-25	2.895E-24	1.487E-23	1.202E-22	7.632E-22	3.374E-21	5.107E-21	5.059E-21
Th-230	U-238	3.359E-07	4.630E-21	3.200E-20	1.644E-19	1.329E-18	8.437E-18	3.730E-17	5.645E-17	5.593E-17
Th-230	U-238	4.434E-13	6.111E-27	4.224E-26	2.170E-25	1.754E-24	1.114E-23	4.924E-23	7.452E-23	7.382E-23
Th-230	U-238	6.383E-15	8.796E-29	6.080E-28	3.123E-27	2.524E-26	1.603E-25	7.087E-25	1.073E-24	1.063E-24
Th-230	U-238	3.196E-07	4.405E-21	3.045E-20	1.564E-19	1.264E-18	8.027E-18	3.549E-17	5.371E-17	5.321E-17
Th-230	U-238	4.219E-13	5.814E-27	4.019E-26	2.065E-25	1.669E-24	1.060E-23	4.685E-23	7.090E-23	7.024E-23
Th-230	U-238	6.073E-15	8.369E-29	5.785E-28	2.972E-27	2.402E-26	1.525E-25	6.743E-25	1.021E-24	1.011E-24
Th-230	U-238	6.713E-11	9.252E-25	6.395E-24	3.285E-23	2.655E-22	1.686E-21	7.454E-21	1.128E-20	1.118E-20
Th-230	U-238	8.862E-17	1.220E-30	8.430E-30	4.336E-29	3.505E-28	2.226E-27	9.840E-27	1.489E-26	1.475E-26
Th-230	U-238	1.276E-18	1.615E-32	1.116E-31	6.233E-31	5.038E-30	3.203E-29	1.416E-28	2.144E-28	2.123E-28
Th-230	U-238	3.200E-10	4.410E-24	3.048E-23	1.566E-22	1.266E-21	8.037E-21	3.553E-20	5.378E-20	5.327E-20
Th-230	U-238	4.224E-16	5.813E-30	4.024E-29	2.067E-28	1.671E-27	1.061E-26	4.690E-26	7.098E-26	7.032E-26
Th-230	U-238	6.080E-18	7.697E-32	5.784E-31	2.971E-30	2.405E-29	1.527E-28	6.751E-28	1.022E-27	1.012E-27
Th-230	U-238	9.980E-01	1.375E-14	9.507E-14	4.884E-13	3.947E-12	2.506E-11	1.108E-10	1.677E-10	1.661E-10
Th-230	U-238	1.317E-06	1.815E-20	1.255E-19	6.447E-19	5.210E-18	3.308E-17	1.463E-16	2.214E-16	2.193E-16
Th-230	U-238	1.896E-08	2.613E-22	1.806E-21	9.279E-21	7.500E-20	4.762E-19	2.106E-18	3.187E-18	3.157E-18

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 42
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	2.889E-18	1.997E-17	1.026E-16	8.291E-16	5.264E-15	2.328E-14	3.523E-14	3.490E-14
Th-230	U-238	2.767E-10	3.813E-24	2.636E-23	1.354E-22	1.094E-21	6.949E-21	3.073E-20	4.650E-20	4.607E-20
Th-230	U-238	3.983E-12	5.489E-26	3.794E-25	1.949E-24	1.575E-23	1.000E-22	4.423E-22	6.693E-22	6.631E-22
Th-230	U-238	1.994E-04	2.748E-18	1.900E-17	9.760E-17	7.888E-16	5.009E-15	2.215E-14	3.352E-14	3.320E-14
Th-230	U-238	2.633E-10	3.628E-24	2.508E-23	1.288E-22	1.041E-21	6.612E-21	2.923E-20	4.424E-20	4.383E-20
Th-230	U-238	3.789E-12	5.222E-26	3.610E-25	1.854E-24	1.499E-23	9.517E-23	4.208E-22	6.368E-22	6.308E-22
Th-230	U-238	4.189E-08	5.773E-22	3.990E-21	2.050E-20	1.657E-19	1.052E-18	4.652E-18	7.040E-18	6.974E-18
Th-230	U-238	5.530E-14	7.620E-28	5.267E-27	2.706E-26	2.187E-25	1.389E-24	6.140E-24	9.292E-24	9.206E-24
Th-230	U-238	7.959E-16	1.097E-29	7.582E-29	3.895E-28	3.148E-27	1.999E-26	8.838E-26	1.338E-25	1.325E-25
Th-230	U-238	1.997E-07	2.752E-21	1.902E-20	9.771E-20	7.898E-19	5.015E-18	2.217E-17	3.356E-17	3.324E-17
Th-230	U-238	2.636E-13	3.632E-27	2.511E-26	1.290E-25	1.042E-24	6.620E-24	2.927E-23	4.429E-23	4.388E-23
Th-230	U-238	3.794E-15	5.228E-29	3.614E-28	1.857E-27	1.501E-26	9.528E-26	4.213E-25	6.376E-25	6.316E-25
Th-230	ΣDOSE(j)		2.682E-01	2.682E-01	2.682E-01	2.682E-01	2.680E-01	2.675E-01	2.660E-01	2.609E-01
0Th-230	Th-230	1.899E-08	5.097E-09	5.096E-09	5.096E-09	5.095E-09	5.092E-09	5.083E-09	5.054E-09	4.957E-09
Th-230	Th-230	2.100E-04	5.634E-05	5.634E-05	5.634E-05	5.633E-05	5.630E-05	5.619E-05	5.588E-05	5.480E-05
Th-230	ΣDOSE(j)		5.635E-05	5.635E-05	5.634E-05	5.633E-05	5.630E-05	5.619E-05	5.588E-05	5.481E-05
0Ra-226	Th-230	2.100E-04	4.020E-07	1.197E-06	2.750E-06	7.800E-06	1.942E-05	3.988E-05	4.874E-05	4.721E-05
Ra-226	Th-230	3.989E-12	7.638E-15	2.275E-14	5.224E-14	1.482E-13	3.690E-13	7.577E-13	9.261E-13	8.971E-13
Ra-226	U-234	2.100E-04	1.473E-14	1.020E-13	5.257E-13	4.306E-12	2.835E-11	1.394E-10	2.391E-10	2.357E-10
Ra-226	U-234	2.771E-10	1.944E-20	1.346E-19	6.939E-19	5.683E-18	3.743E-17	1.840E-16	3.156E-16	3.111E-16
Ra-226	U-234	3.989E-12	2.798E-22	1.937E-21	9.988E-21	8.181E-20	5.387E-19	2.649E-18	4.542E-18	4.479E-18
Ra-226	U-238	3.359E-07	1.659E-23	2.456E-22	2.784E-21	6.650E-20	1.210E-18	1.627E-17	4.678E-17	4.818E-17
Ra-226	U-238	4.434E-13	2.189E-29	3.242E-28	3.675E-27	8.778E-26	1.597E-24	2.148E-23	6.174E-23	6.360E-23
Ra-226	U-238	6.383E-15	3.052E-31	4.665E-30	5.289E-29	1.264E-27	2.299E-26	3.091E-25	8.887E-25	9.155E-25
Ra-226	U-238	2.096E-04	1.035E-20	1.533E-19	1.737E-18	4.150E-17	7.550E-16	1.015E-14	2.919E-14	3.007E-14
Ra-226	U-238	2.767E-10	1.366E-26	2.023E-25	2.293E-24	5.478E-23	9.967E-22	1.340E-20	3.853E-20	3.969E-20
Ra-226	U-238	3.983E-12	1.967E-28	2.912E-27	3.301E-26	7.884E-25	1.435E-23	1.929E-22	5.546E-22	5.713E-22
Ra-226	ΣDOSE(j)		4.020E-07	1.197E-06	2.750E-06	7.800E-06	1.942E-05	3.988E-05	4.874E-05	4.721E-05
0Th-230	Th-230	2.771E-10	7.437E-11	7.437E-11	7.437E-11	7.435E-11	7.431E-11	7.417E-11	7.376E-11	7.234E-11
Th-230	Th-230	3.989E-12	1.071E-12	1.070E-12	1.070E-12	1.070E-12	1.070E-12	1.068E-12	1.062E-12	1.041E-12
Th-230	ΣDOSE(j)		7.544E-11	7.544E-11	7.544E-11	7.542E-11	7.538E-11	7.523E-11	7.482E-11	7.338E-11
0Ra-226	Th-230	2.771E-10	5.307E-13	1.581E-12	3.630E-12	1.030E-11	2.564E-11	5.264E-11	6.434E-11	6.232E-11
0Th-230	Th-230	1.998E-04	5.361E-05	5.360E-05	5.360E-05	5.359E-05	5.356E-05	5.346E-05	5.316E-05	5.214E-05
Th-230	Th-230	2.637E-10	7.076E-11	7.076E-11	7.075E-11	7.074E-11	7.070E-11	7.056E-11	7.017E-11	6.883E-11
Th-230	ΣDOSE(j)		5.361E-05	5.360E-05	5.360E-05	5.359E-05	5.356E-05	5.346E-05	5.316E-05	5.214E-05
0Th-230	Th-230	3.795E-12	1.019E-12	1.018E-12	1.018E-12	1.018E-12	1.018E-12	1.016E-12	1.010E-12	9.907E-13
Th-230	Th-230	4.196E-08	1.126E-08	1.126E-08	1.126E-08	1.126E-08	1.125E-08	1.123E-08	1.117E-08	1.095E-08
Th-230	ΣDOSE(j)		1.126E-08	1.126E-08	1.126E-08	1.126E-08	1.125E-08	1.123E-08	1.117E-08	1.095E-08
0Ra-226	Th-230	4.196E-08	7.661E-11	2.282E-10	5.240E-10	1.487E-09	3.701E-09	7.600E-09	9.287E-09	8.990E-09
Ra-226	Th-230	7.972E-16	1.456E-18	4.336E-18	9.956E-18	2.824E-17	7.032E-17	1.444E-16	1.765E-16	1.708E-16
Ra-226	U-234	4.196E-08	2.806E-18	1.943E-17	1.002E-16	8.205E-16	5.404E-15	2.657E-14	4.555E-14	4.488E-14
Ra-226	U-234	5.538E-14	3.704E-24	2.565E-23	1.322E-22	1.083E-21	7.133E-21	3.507E-20	6.013E-20	5.924E-20

1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 43
Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	5.332E-26	3.692E-25	1.904E-24	1.559E-23	1.027E-22	5.048E-22	8.654E-22	8.527E-22
Ra-226	U-238	6.713E-11	3.161E-27	4.681E-26	5.306E-25	1.267E-23	2.306E-22	3.101E-21	8.912E-21	9.174E-21
Ra-226	U-238	8.862E-17	0.000E+00	5.975E-32	7.000E-31	1.672E-29	3.044E-28	4.093E-27	1.176E-26	1.211E-26
Ra-226	U-238	1.276E-18	0.000E+00	0.000E+00	0.000E+00	2.328E-31	4.379E-30	5.891E-29	1.693E-28	1.743E-28
Ra-226	U-238	4.189E-08	1.973E-24	2.921E-23	3.311E-22	7.908E-21	1.439E-19	1.935E-18	5.561E-18	5.724E-18
Ra-226	U-238	5.530E-14	2.603E-30	3.856E-29	4.370E-28	1.044E-26	1.899E-25	2.554E-24	7.341E-24	7.556E-24
Ra-226	U-238	7.959E-16	3.624E-32	5.548E-31	6.288E-30	1.503E-28	2.734E-27	3.676E-26	1.057E-25	1.088E-25
Ra-226	ΣDOSE(j)		7.661E-11	2.282E-10	5.240E-10	1.487E-09	3.701E-09	7.600E-09	9.287E-09	8.990E-09
0Th-230	Th-230	5.538E-14	1.486E-14	1.486E-14	1.486E-14	1.486E-14	1.485E-14	1.482E-14	1.474E-14	1.446E-14
Th-230	Th-230	7.972E-16	2.139E-16	2.139E-16	2.139E-16	2.139E-16	2.138E-16	2.133E-16	2.122E-16	2.081E-16
Th-230	ΣDOSE(j)		1.508E-14	1.508E-14	1.508E-14	1.507E-14	1.506E-14	1.503E-14	1.495E-14	1.466E-14
0Ra-226	Th-230	5.538E-14	1.011E-16	3.012E-16	6.917E-16	1.962E-15	4.885E-15	1.003E-14	1.226E-14	1.187E-14
0Th-230	Th-230	2.000E-07	5.367E-08	5.367E-08	5.367E-08	5.366E-08	5.363E-08	5.352E-08	5.323E-08	5.220E-08
Th-230	Th-230	2.640E-13	7.085E-14	7.084E-14	7.084E-14	7.083E-14	7.079E-14	7.065E-14	7.026E-14	6.891E-14
Th-230	ΣDOSE(j)		5.367E-08	5.367E-08	5.367E-08	5.366E-08	5.363E-08	5.352E-08	5.323E-08	5.220E-08
0Th-230	Th-230	3.800E-15	1.020E-15	1.020E-15	1.020E-15	1.019E-15	1.019E-15	1.017E-15	1.011E-15	9.919E-16
0Th-232	Th-232	1.000E+00	2.999E-04	2.999E-04	2.999E-04	2.999E-04	2.998E-04	2.994E-04	2.983E-04	2.944E-04
0U-234	U-234	9.996E-01	3.028E-04	2.961E-04	2.833E-04	2.427E-04	1.559E-04	3.311E-05	3.961E-07	7.413E-14
U-234	U-234	1.319E-06	3.996E-10	3.909E-10	3.740E-10	3.203E-10	2.057E-10	4.371E-11	5.228E-13	9.785E-20
U-234	U-238	1.599E-03	6.813E-13	2.004E-12	4.477E-12	1.151E-11	2.148E-11	1.503E-11	5.379E-13	3.355E-19
U-234	U-238	2.111E-09	8.994E-19	2.646E-18	5.910E-18	1.519E-17	2.835E-17	1.985E-17	7.100E-19	4.429E-25
U-234	U-238	3.039E-11	1.295E-20	3.808E-20	8.507E-20	2.187E-19	4.080E-19	2.857E-19	1.022E-20	6.375E-27
U-234	U-238	3.359E-07	1.431E-16	4.210E-16	9.404E-16	2.417E-15	4.511E-15	3.158E-15	1.130E-16	7.048E-23
U-234	U-238	4.434E-13	1.889E-22	5.557E-22	1.241E-21	3.191E-21	5.954E-21	4.169E-21	1.491E-22	9.303E-29
U-234	U-238	6.383E-15	2.719E-24	7.998E-24	1.787E-23	4.593E-23	8.571E-23	6.000E-23	2.147E-24	1.333E-30
U-234	U-238	3.196E-07	1.362E-16	4.005E-16	8.947E-16	2.300E-15	4.292E-15	3.005E-15	1.075E-16	6.705E-23
U-234	U-238	4.219E-13	1.797E-22	5.287E-22	1.181E-21	3.036E-21	5.665E-21	3.966E-21	1.419E-22	8.851E-29
U-234	U-238	6.073E-15	2.587E-24	7.610E-24	1.700E-23	4.370E-23	8.154E-23	5.709E-23	2.042E-24	1.268E-30
U-234	U-238	6.713E-11	2.860E-20	8.413E-20	1.879E-19	4.831E-19	9.015E-19	6.311E-19	2.258E-20	1.408E-26
U-234	U-238	8.862E-17	3.775E-26	1.110E-25	2.481E-25	6.376E-25	1.190E-24	8.330E-25	2.980E-26	1.601E-32
U-234	U-238	1.276E-18	5.434E-28	1.598E-27	3.571E-27	9.178E-27	1.713E-26	1.199E-26	4.290E-28	0.000E+00
U-234	U-238	3.200E-10	1.363E-19	4.010E-19	8.958E-19	2.303E-18	4.297E-18	3.008E-18	1.076E-19	6.713E-26
U-234	U-238	4.224E-16	1.799E-25	5.293E-25	1.182E-24	3.039E-24	5.672E-24	3.971E-24	1.421E-25	7.630E-32
U-234	U-238	6.080E-18	2.590E-27	7.619E-27	1.702E-26	4.375E-26	8.164E-26	5.716E-26	2.045E-27	0.000E+00
U-234	U-238	9.980E-01	4.251E-10	1.251E-09	2.794E-09	7.181E-09	1.340E-08	9.382E-09	3.356E-10	2.094E-16
U-234	U-238	1.317E-06	5.612E-16	1.651E-15	3.688E-15	9.479E-15	1.769E-14	1.238E-14	4.430E-16	2.764E-22
U-234	U-238	1.896E-08	8.078E-18	2.376E-17	5.308E-17	1.364E-16	2.546E-16	1.783E-16	6.377E-18	3.978E-24
U-234	U-238	2.096E-04	8.930E-14	2.627E-13	5.868E-13	1.508E-12	2.815E-12	1.971E-12	7.050E-14	4.398E-20
U-234	U-238	2.767E-10	1.179E-19	3.467E-19	7.746E-19	1.991E-18	3.716E-18	2.601E-18	9.306E-20	5.805E-26
U-234	U-238	3.983E-12	1.697E-21	4.991E-21	1.115E-20	2.866E-20	5.348E-20	3.744E-20	1.339E-21	8.356E-28
U-234	U-238	1.994E-04	8.496E-14	2.499E-13	5.583E-13	1.435E-12	2.678E-12	1.875E-12	6.707E-14	4.184E-20
U-234	U-238	2.633E-10	1.121E-19	3.299E-19	7.370E-19	1.894E-18	3.535E-18	2.475E-18	8.854E-20	5.523E-26
U-234	U-238	3.789E-12	1.614E-21	4.749E-21	1.061E-20	2.727E-20	5.088E-20	3.562E-20	1.274E-21	7.950E-28

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	1.785E-17	5.249E-17	1.173E-16	3.014E-16	5.625E-16	3.938E-16	1.409E-17	8.788E-24
U-234	U-238	5.530E-14	2.356E-23	6.929E-23	1.548E-22	3.979E-22	7.425E-22	5.198E-22	1.860E-23	1.160E-29
U-234	U-238	7.959E-16	3.391E-25	9.974E-25	2.228E-24	5.727E-24	1.069E-23	7.482E-24	2.677E-25	1.662E-31
U-234	U-238	1.997E-07	8.506E-17	2.502E-16	5.590E-16	1.437E-15	2.681E-15	1.877E-15	6.716E-17	4.189E-23
U-234	U-238	2.636E-13	1.123E-22	3.303E-22	7.378E-22	1.897E-21	3.539E-21	2.478E-21	8.865E-23	5.530E-29
U-234	U-238	3.794E-15	1.616E-24	4.754E-24	1.062E-23	2.730E-23	5.094E-23	3.567E-23	1.276E-24	7.922E-31
U-234	ΣDOSE(j)		3.028E-04	2.961E-04	2.833E-04	2.427E-04	1.559E-04	3.312E-05	3.964E-07	7.434E-14
0U-234	U-234	1.899E-08	5.752E-12	5.627E-12	5.383E-12	4.610E-12	2.962E-12	6.291E-13	7.525E-15	1.409E-21
U-234	U-234	2.100E-04	6.359E-08	6.220E-08	5.951E-08	5.097E-08	3.274E-08	6.955E-09	8.319E-11	1.557E-17
U-234	ΣDOSE(j)		6.360E-08	6.221E-08	5.951E-08	5.097E-08	3.274E-08	6.956E-09	8.320E-11	1.557E-17
0U-234	U-234	2.771E-10	8.394E-14	8.211E-14	7.855E-14	6.728E-14	4.322E-14	9.181E-15	1.098E-16	2.055E-23
U-234	U-234	3.989E-12	1.208E-15	1.182E-15	1.131E-15	9.684E-16	6.221E-16	1.321E-16	1.581E-18	2.958E-25
U-234	ΣDOSE(j)		8.515E-14	8.329E-14	7.968E-14	6.825E-14	4.384E-14	9.313E-15	1.114E-16	2.085E-23
0U-234	U-234	1.998E-04	6.050E-08	5.918E-08	5.662E-08	4.849E-08	3.115E-08	6.617E-09	7.915E-11	1.481E-17
U-234	U-234	2.637E-10	7.986E-14	7.812E-14	7.473E-14	6.401E-14	4.112E-14	8.735E-15	1.045E-16	1.956E-23
U-234	ΣDOSE(j)		6.050E-08	5.918E-08	5.662E-08	4.849E-08	3.115E-08	6.617E-09	7.915E-11	1.481E-17
0U-234	U-234	3.795E-12	1.150E-15	1.124E-15	1.076E-15	9.213E-16	5.918E-16	1.257E-16	1.504E-18	2.815E-25
U-234	U-234	4.196E-08	1.271E-11	1.243E-11	1.189E-11	1.019E-11	6.543E-12	1.390E-12	1.663E-14	3.112E-21
U-234	ΣDOSE(j)		1.271E-11	1.243E-11	1.189E-11	1.019E-11	6.543E-12	1.390E-12	1.663E-14	3.112E-21
0U-234	U-234	5.538E-14	1.678E-17	1.641E-17	1.570E-17	1.344E-17	8.636E-18	1.835E-18	2.195E-20	4.107E-27
U-234	U-234	7.972E-16	2.415E-19	2.362E-19	2.259E-19	1.935E-19	1.243E-19	2.641E-20	3.159E-22	5.912E-29
U-234	ΣDOSE(j)		1.702E-17	1.664E-17	1.592E-17	1.364E-17	8.761E-18	1.861E-18	2.226E-20	4.167E-27
0U-234	U-234	2.000E-07	6.058E-11	5.925E-11	5.669E-11	4.855E-11	3.119E-11	6.625E-12	7.925E-14	1.483E-20
U-234	U-234	2.640E-13	7.996E-17	7.821E-17	7.483E-17	6.409E-17	4.117E-17	8.745E-18	1.046E-19	1.958E-26
U-234	ΣDOSE(j)		6.058E-11	5.925E-11	5.669E-11	4.855E-11	3.119E-11	6.625E-12	7.925E-14	1.483E-20
0U-234	U-234	3.800E-15	1.151E-18	1.126E-18	1.077E-18	9.225E-19	5.926E-19	1.259E-19	1.506E-21	2.818E-28
0U-235	U-235	9.835E-01	1.346E-04	1.317E-04	1.260E-04	1.079E-04	6.932E-05	1.473E-05	1.763E-07	3.305E-14
U-235	U-235	2.722E-03	3.726E-07	3.645E-07	3.487E-07	2.987E-07	1.919E-07	4.077E-08	4.881E-10	9.148E-17
U-235	ΣDOSE(j)		1.350E-04	1.321E-04	1.263E-04	1.082E-04	6.952E-05	1.477E-05	1.768E-07	3.314E-14
0U-235	U-235	1.376E-02	1.884E-06	1.843E-06	1.763E-06	1.510E-06	9.700E-07	2.061E-07	2.467E-09	4.625E-16
U-235	U-235	3.809E-05	5.214E-09	5.100E-09	4.879E-09	4.179E-09	2.685E-09	5.705E-10	6.829E-12	1.280E-18
U-235	ΣDOSE(j)		1.889E-06	1.848E-06	1.768E-06	1.514E-06	9.727E-07	2.067E-07	2.474E-09	4.638E-16
0U-235	U-235	8.257E-07	1.130E-10	1.106E-10	1.058E-10	9.060E-11	5.820E-11	1.237E-11	1.481E-13	2.775E-20
U-235	U-235	2.285E-09	3.128E-13	3.060E-13	2.928E-13	2.507E-13	1.611E-13	3.423E-14	4.098E-16	7.680E-23
U-235	ΣDOSE(j)		1.134E-10	1.109E-10	1.061E-10	9.085E-11	5.836E-11	1.240E-11	1.485E-13	2.783E-20
0U-238	U-238	5.450E-07	1.485E-10	1.452E-10	1.389E-10	1.190E-10	7.645E-11	1.624E-11	1.944E-13	3.646E-20
U-238	U-238	1.599E-03	5.171E-05	5.058E-05	4.839E-05	4.145E-05	2.662E-05	5.652E-06	6.747E-08	1.247E-14
U-238	ΣDOSE(j)		5.172E-05	5.058E-05	4.839E-05	4.145E-05	2.662E-05	5.652E-06	6.747E-08	1.247E-14

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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	6.826E-11	6.677E-11	6.388E-11	5.471E-11	3.514E-11	7.460E-12	8.906E-14	1.646E-20
U-238	U-238	3.039E-11	9.826E-13	9.611E-13	9.194E-13	7.875E-13	5.058E-13	1.074E-13	1.282E-15	2.369E-22
U-238	ΣDOSE(j)		6.925E-11	6.773E-11	6.480E-11	5.550E-11	3.564E-11	7.567E-12	9.034E-14	1.670E-20
0U-238	U-238	3.359E-07	1.086E-08	1.062E-08	1.016E-08	8.705E-09	5.591E-09	1.187E-09	1.417E-11	2.619E-18
U-238	U-238	4.434E-13	1.434E-14	1.402E-14	1.342E-14	1.149E-14	7.380E-15	1.567E-15	1.871E-17	3.458E-24
U-238	ΣDOSE(j)		1.086E-08	1.062E-08	1.016E-08	8.705E-09	5.591E-09	1.187E-09	1.417E-11	2.619E-18
0U-238	U-238	6.383E-15	2.064E-16	2.019E-16	1.931E-16	1.654E-16	1.062E-16	2.255E-17	2.693E-19	4.977E-26
U-238	U-238	3.196E-07	1.033E-08	1.011E-08	9.671E-09	8.282E-09	5.319E-09	1.129E-09	1.348E-11	2.492E-18
U-238	ΣDOSE(j)		1.033E-08	1.011E-08	9.671E-09	8.282E-09	5.319E-09	1.129E-09	1.348E-11	2.492E-18
0U-238	U-238	4.219E-13	1.364E-14	1.334E-14	1.277E-14	1.093E-14	7.022E-15	1.491E-15	1.780E-17	3.290E-24
U-238	U-238	6.073E-15	1.964E-16	1.921E-16	1.837E-16	1.574E-16	1.011E-16	2.146E-17	2.562E-19	4.735E-26
U-238	ΣDOSE(j)		1.384E-14	1.354E-14	1.295E-14	1.109E-14	7.123E-15	1.512E-15	1.805E-17	3.337E-24
0U-238	U-238	6.713E-11	2.171E-12	2.123E-12	2.031E-12	1.740E-12	1.117E-12	2.372E-13	2.832E-15	5.235E-22
U-238	U-238	8.862E-17	2.865E-18	2.803E-18	2.681E-18	2.296E-18	1.475E-18	3.131E-19	3.738E-21	6.910E-28
U-238	ΣDOSE(j)		2.171E-12	2.123E-12	2.031E-12	1.740E-12	1.117E-12	2.372E-13	2.832E-15	5.235E-22
0U-238	U-238	1.276E-18	4.124E-20	4.034E-20	3.859E-20	3.305E-20	2.123E-20	4.507E-21	5.381E-23	9.935E-30
U-238	U-238	3.200E-10	1.035E-11	1.012E-11	9.682E-12	8.292E-12	5.326E-12	1.131E-12	1.350E-14	2.495E-21
U-238	ΣDOSE(j)		1.035E-11	1.012E-11	9.682E-12	8.292E-12	5.326E-12	1.131E-12	1.350E-14	2.495E-21
0U-238	U-238	4.224E-16	1.366E-17	1.336E-17	1.278E-17	1.095E-17	7.030E-18	1.493E-18	1.782E-20	3.294E-27
U-238	U-238	6.080E-18	1.966E-19	1.923E-19	1.840E-19	1.576E-19	1.012E-19	2.148E-20	2.565E-22	4.741E-29
U-238	ΣDOSE(j)		1.385E-17	1.355E-17	1.296E-17	1.110E-17	7.131E-18	1.514E-18	1.808E-20	3.341E-27
0U-238	U-238	9.980E-01	8.685E-04	8.495E-04	8.127E-04	6.960E-04	4.471E-04	9.496E-05	1.135E-06	2.113E-13
U-238	U-238	1.317E-06	1.146E-09	1.121E-09	1.073E-09	9.188E-10	5.902E-10	1.253E-10	1.498E-12	2.789E-19
U-238	ΣDOSE(j)		8.685E-04	8.495E-04	8.127E-04	6.960E-04	4.471E-04	9.496E-05	1.135E-06	2.113E-13
0U-238	U-238	1.896E-08	1.650E-11	1.614E-11	1.544E-11	1.322E-11	8.495E-12	1.804E-12	2.156E-14	4.014E-21
U-238	U-238	2.096E-04	1.824E-07	1.784E-07	1.707E-07	1.462E-07	9.391E-08	1.995E-08	2.384E-10	4.438E-17
U-238	ΣDOSE(j)		1.824E-07	1.784E-07	1.707E-07	1.462E-07	9.392E-08	1.995E-08	2.384E-10	4.438E-17
0U-238	U-238	2.767E-10	2.408E-13	2.355E-13	2.253E-13	1.930E-13	1.240E-13	2.633E-14	3.147E-16	5.858E-23
U-238	U-238	3.983E-12	3.466E-15	3.390E-15	3.243E-15	2.778E-15	1.784E-15	3.790E-16	4.530E-18	8.432E-25
U-238	ΣDOSE(j)		2.443E-13	2.389E-13	2.286E-13	1.958E-13	1.257E-13	2.671E-14	3.192E-16	5.942E-23
0U-238	U-238	1.994E-04	1.736E-07	1.698E-07	1.624E-07	1.391E-07	8.935E-08	1.898E-08	2.268E-10	4.222E-17
U-238	U-238	2.633E-10	2.291E-13	2.241E-13	2.144E-13	1.836E-13	1.179E-13	2.505E-14	2.994E-16	5.574E-23
U-238	ΣDOSE(j)		1.736E-07	1.698E-07	1.624E-07	1.391E-07	8.935E-08	1.898E-08	2.268E-10	4.222E-17
0U-238	U-238	3.789E-12	3.298E-15	3.225E-15	3.086E-15	2.643E-15	1.698E-15	3.606E-16	4.309E-18	8.022E-25
U-238	U-238	4.189E-08	3.645E-11	3.566E-11	3.411E-11	2.922E-11	1.877E-11	3.986E-12	4.764E-14	8.869E-21
U-238	ΣDOSE(j)		3.646E-11	3.566E-11	3.412E-11	2.922E-11	1.877E-11	3.986E-12	4.765E-14	8.870E-21
0U-238	U-238	5.530E-14	4.812E-17	4.707E-17	4.503E-17	3.857E-17	2.477E-17	5.261E-18	6.289E-20	1.171E-26

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	6.926E-19	6.775E-19	6.481E-19	5.551E-19	3.566E-19	7.573E-20	9.052E-22	1.685E-28
U-238	ΣDOSE(j)		4.881E-17	4.774E-17	4.568E-17	3.912E-17	2.513E-17	5.337E-18	6.379E-20	1.188E-26
0U-238	U-238	1.997E-07	1.738E-10	1.700E-10	1.626E-10	1.393E-10	8.945E-11	1.900E-11	2.271E-13	4.227E-20
U-238	U-238	2.636E-13	2.294E-16	2.244E-16	2.146E-16	1.838E-16	1.181E-16	2.508E-17	2.998E-19	5.580E-26
U-238	ΣDOSE(j)		1.738E-10	1.700E-10	1.626E-10	1.393E-10	8.945E-11	1.900E-11	2.271E-13	4.227E-20
0U-238	U-238	3.794E-15	3.302E-18	3.229E-18	3.089E-18	2.646E-18	1.700E-18	3.610E-19	4.315E-21	8.032E-28

THF(i) is the thread fraction of the parent nuclide.

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	9.835E-01	6.884E-03	6.312E-03	5.306E-03	2.890E-03	5.092E-04	1.170E-06	3.375E-14	1.378E-40
Ac-227	Ac-227	2.722E-03	1.905E-05	1.747E-05	1.469E-05	7.998E-06	1.409E-06	3.237E-09	9.341E-17	3.812E-43
Ac-227	Pa-231	9.835E-01	0.000E+00	4.152E-04	1.119E-03	2.587E-03	2.987E-03	7.390E-04	8.821E-06	1.630E-12
Ac-227	U-235	9.835E-01	0.000E+00	1.649E-10	1.361E-09	1.125E-08	4.595E-08	4.923E-08	1.978E-09	1.274E-15
Ac-227	ΣS(j):		6.903E-03	6.745E-03	6.439E-03	5.485E-03	3.498E-03	7.402E-04	8.823E-06	1.631E-12
0Ac-227	Ac-227	1.376E-02	9.633E-05	8.832E-05	7.424E-05	4.044E-05	7.125E-06	1.636E-08	4.723E-16	1.928E-42
Ac-227	Ac-227	3.809E-05	2.666E-07	2.444E-07	2.055E-07	1.119E-07	1.972E-08	4.529E-11	1.307E-18	5.605E-45
Ac-227	Pa-231	1.376E-02	0.000E+00	5.809E-06	1.565E-05	3.620E-05	4.180E-05	1.034E-05	1.234E-07	2.281E-14
Ac-227	U-235	1.376E-02	0.000E+00	2.307E-12	1.905E-11	1.575E-10	6.430E-10	6.888E-10	2.768E-11	1.783E-17
Ac-227	ΣS(j):		9.659E-05	9.437E-05	9.010E-05	7.674E-05	4.894E-05	1.036E-05	1.234E-07	2.282E-14
0Ac-227	Ac-227	8.257E-07	5.780E-09	5.299E-09	4.455E-09	2.426E-09	4.275E-10	9.819E-13	2.834E-20	0.000E+00
Ac-227	Ac-227	2.285E-09	1.600E-11	1.467E-11	1.233E-11	6.715E-12	1.183E-12	2.718E-15	7.843E-23	0.000E+00
Ac-227	Pa-231	8.257E-07	0.000E+00	3.486E-10	9.391E-10	2.172E-09	2.508E-09	6.204E-10	7.406E-12	1.368E-18
Ac-227	U-235	8.257E-07	0.000E+00	1.384E-16	1.143E-15	9.448E-15	3.858E-14	4.133E-14	1.661E-15	1.070E-21
Ac-227	ΣS(j):		5.796E-09	5.663E-09	5.406E-09	4.605E-09	2.937E-09	6.215E-10	7.407E-12	1.370E-18
0Pa-231	Pa-231	9.835E-01	1.377E-02	1.347E-02	1.288E-02	1.103E-02	7.085E-03	1.503E-03	1.791E-05	3.310E-12
Pa-231	Pa-231	2.722E-03	3.811E-05	3.727E-05	3.566E-05	3.054E-05	1.961E-05	4.160E-06	4.958E-08	9.161E-15
Pa-231	U-235	9.835E-01	0.000E+00	1.058E-08	3.038E-08	8.672E-08	1.671E-07	1.183E-07	4.237E-09	2.629E-15
Pa-231	U-235	2.722E-03	0.000E+00	2.929E-11	8.407E-11	2.400E-10	4.624E-10	3.273E-10	1.173E-11	7.276E-18
Pa-231	U-235	1.376E-02	0.000E+00	1.481E-10	4.250E-10	1.213E-09	2.338E-09	1.655E-09	5.928E-11	3.679E-17
Pa-231	U-235	3.809E-05	0.000E+00	4.099E-13	1.176E-12	3.358E-12	6.470E-12	4.579E-12	1.641E-13	1.018E-19
Pa-231	U-235	8.257E-07	0.000E+00	8.886E-15	2.550E-14	7.281E-14	1.403E-13	9.928E-14	3.557E-15	2.207E-21
Pa-231	U-235	2.285E-09	0.000E+00	2.459E-17	7.058E-17	2.015E-16	3.883E-16	2.748E-16	9.845E-18	6.109E-24
Pa-231	ΣS(j):		1.381E-02	1.350E-02	1.292E-02	1.106E-02	7.104E-03	1.507E-03	1.797E-05	3.322E-12
0Ac-227	Pa-231	2.722E-03	0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.441E-08	4.511E-15
Ac-227	U-235	2.722E-03	0.000E+00	4.564E-13	3.767E-12	3.115E-11	1.272E-10	1.362E-10	5.475E-12	3.527E-18
Ac-227	ΣS(j):		0.000E+00	1.149E-06	3.096E-06	7.159E-06	8.267E-06	2.045E-06	2.442E-08	4.514E-15
0Pa-231	Pa-231	1.376E-02	1.927E-04	1.884E-04	1.803E-04	1.544E-04	9.913E-05	2.103E-05	2.506E-07	4.632E-14
Pa-231	Pa-231	3.809E-05	5.332E-07	5.215E-07	4.989E-07	4.273E-07	2.744E-07	5.821E-08	6.937E-10	1.282E-16
Pa-231	ΣS(j):		1.932E-04	1.890E-04	1.808E-04	1.548E-04	9.941E-05	2.109E-05	2.513E-07	4.644E-14
0Ac-227	Pa-231	3.809E-05	0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.416E-10	6.312E-17
Ac-227	U-235	3.809E-05	0.000E+00	6.386E-15	5.271E-14	4.358E-13	1.779E-12	1.906E-12	7.661E-14	4.935E-20
Ac-227	ΣS(j):		0.000E+00	1.608E-08	4.332E-08	1.002E-07	1.157E-07	2.862E-08	3.417E-10	6.317E-17
0Pa-231	Pa-231	8.257E-07	1.156E-08	1.131E-08	1.082E-08	9.263E-09	5.948E-09	1.262E-09	1.504E-11	2.779E-18
Pa-231	Pa-231	2.285E-09	3.199E-11	3.129E-11	2.994E-11	2.564E-11	1.646E-11	3.493E-12	4.162E-14	7.691E-21
Pa-231	ΣS(j):		1.159E-08	1.134E-08	1.085E-08	9.289E-09	5.965E-09	1.265E-09	1.508E-11	2.787E-18
0Ac-227	Pa-231	2.285E-09	0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.787E-21
Ac-227	U-235	2.285E-09	0.000E+00	3.832E-19	3.163E-18	2.615E-17	1.068E-16	1.144E-16	4.597E-18	2.961E-24
Ac-227	ΣS(j):		0.000E+00	9.647E-13	2.599E-12	6.011E-12	6.941E-12	1.717E-12	2.050E-14	3.790E-21
0Pb-210	Pb-210	1.000E+00	8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	0.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣS(j):			8.000E-03	7.669E-03	7.046E-03	5.240E-03	2.248E-03	1.163E-04	2.458E-08	3.373E-21
0Pb-210	Pb-210	0.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Pb-210	0.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.319E-06		0.000E+00	2.801E-10	7.926E-10	2.158E-09	3.686E-09	2.017E-09	8.428E-11	9.625E-16
Pb-210	Ra-226	2.771E-10		0.000E+00	5.883E-14	1.665E-13	4.532E-13	7.742E-13	4.237E-13	1.770E-14	2.022E-19
Pb-210	Ra-226	2.637E-10		0.000E+00	5.597E-14	1.584E-13	4.312E-13	7.366E-13	4.031E-13	1.684E-14	1.924E-19
Pb-210	Ra-226	5.538E-14		0.000E+00	1.176E-17	3.327E-17	9.057E-17	1.547E-16	8.467E-17	3.538E-18	4.040E-23
Pb-210	Ra-226	2.640E-13		0.000E+00	5.604E-17	1.586E-16	4.317E-16	7.375E-16	4.036E-16	1.686E-17	1.926E-22
Pb-210	Th-230	1.319E-06		0.000E+00	8.751E-12	7.577E-11	7.368E-10	4.622E-09	1.787E-08	2.547E-08	2.530E-08
Pb-210	Th-230	2.771E-10		0.000E+00	1.838E-15	1.591E-14	1.548E-13	9.708E-13	3.753E-12	5.350E-12	5.313E-12
Pb-210	Th-230	2.637E-10		0.000E+00	1.749E-15	1.514E-14	1.472E-13	9.236E-13	3.570E-12	5.090E-12	5.055E-12
Pb-210	Th-230	5.538E-14		0.000E+00	3.673E-19	3.180E-18	3.093E-17	1.940E-16	7.499E-16	1.069E-15	1.062E-15
Pb-210	Th-230	2.640E-13		0.000E+00	1.751E-18	1.516E-17	1.474E-16	9.247E-16	3.575E-15	5.096E-15	5.061E-15
Pb-210	U-234	1.319E-06		0.000E+00	3.217E-19	8.343E-18	2.689E-16	4.937E-15	5.437E-14	1.237E-13	1.263E-13
Pb-210	U-234	2.771E-10		0.000E+00	6.757E-23	1.752E-21	5.647E-20	1.037E-18	1.142E-17	2.598E-17	2.653E-17
Pb-210	U-234	2.637E-10		0.000E+00	6.428E-23	1.667E-21	5.373E-20	9.866E-19	1.087E-17	2.472E-17	2.524E-17
Pb-210	U-234	5.538E-14		0.000E+00	1.350E-26	3.502E-25	1.129E-23	2.072E-22	2.282E-21	5.192E-21	5.301E-21
Pb-210	U-234	2.640E-13		0.000E+00	6.436E-26	1.669E-24	5.379E-23	9.878E-22	1.088E-20	2.475E-20	2.527E-20
Pb-210	U-238	2.111E-09		0.000E+00	3.631E-28	2.823E-26	3.022E-24	1.642E-22	5.511E-21	2.374E-20	2.581E-20
Pb-210	U-238	4.434E-13		0.000E+00	7.628E-32	5.930E-30	6.348E-28	3.449E-26	1.158E-24	4.987E-24	5.422E-24
Pb-210	U-238	4.219E-13		0.000E+00	7.257E-32	5.642E-30	6.040E-28	3.282E-26	1.101E-24	4.745E-24	5.159E-24
Pb-210	U-238	8.862E-17		0.000E+00	1.524E-35	1.185E-33	1.269E-31	6.893E-30	2.313E-28	9.966E-28	1.084E-27
Pb-210	U-238	4.224E-16		0.000E+00	7.266E-35	5.649E-33	6.047E-31	3.286E-29	1.103E-27	4.751E-27	5.165E-27
Pb-210	U-238	1.317E-06		0.000E+00	2.266E-25	1.762E-23	1.886E-21	1.025E-19	3.439E-18	1.482E-17	1.611E-17
Pb-210	U-238	2.767E-10		0.000E+00	4.760E-29	3.700E-27	3.961E-25	2.152E-23	7.224E-22	3.112E-21	3.383E-21
Pb-210	U-238	2.633E-10		0.000E+00	4.528E-29	3.521E-27	3.769E-25	2.048E-23	6.873E-22	2.961E-21	3.219E-21
Pb-210	U-238	5.530E-14		0.000E+00	9.512E-33	7.395E-31	7.916E-29	4.301E-27	1.444E-25	6.219E-25	6.761E-25
Pb-210	U-238	2.636E-13		0.000E+00	4.534E-32	3.525E-30	3.773E-28	2.050E-26	6.881E-25	2.964E-24	3.223E-24
Pb-210	ΣS(j):			0.000E+00	2.889E-10	8.687E-10	2.896E-09	8.311E-09	1.989E-08	2.557E-08	2.531E-08
0Ra-226	Ra-226	9.996E-01		6.997E-03	6.884E-03	6.664E-03	5.947E-03	4.296E-03	1.377E-03	5.330E-05	6.084E-10
Ra-226	Ra-226	1.319E-06		9.236E-09	9.087E-09	8.797E-09	7.850E-09	5.671E-09	1.817E-09	7.035E-11	8.031E-16
Ra-226	Th-230	9.996E-01		0.000E+00	4.295E-04	1.268E-03	3.996E-03	1.028E-02	2.136E-02	2.626E-02	2.595E-02
Ra-226	Th-230	1.319E-06		0.000E+00	5.670E-10	1.674E-09	5.275E-09	1.356E-08	2.819E-08	3.466E-08	3.426E-08
Ra-226	Th-230	1.899E-08		0.000E+00	8.161E-12	2.409E-11	7.593E-11	1.953E-10	4.058E-10	4.989E-10	4.931E-10
Ra-226	U-234	9.996E-01		0.000E+00	2.359E-11	2.069E-10	2.104E-09	1.479E-08	7.445E-08	1.288E-07	1.296E-07
Ra-226	U-234	1.319E-06		0.000E+00	3.114E-17	2.732E-16	2.778E-15	1.952E-14	9.828E-14	1.700E-13	1.710E-13
Ra-226	U-234	1.899E-08		0.000E+00	4.482E-19	3.932E-18	3.998E-17	2.810E-16	1.415E-15	2.446E-15	2.462E-15
Ra-226	U-238	1.599E-03		0.000E+00	3.544E-20	9.283E-19	3.095E-17	6.215E-16	8.658E-15	2.519E-14	2.648E-14
Ra-226	U-238	2.111E-09		0.000E+00	4.678E-26	1.225E-24	4.085E-23	8.204E-22	1.143E-20	3.325E-20	3.496E-20
Ra-226	U-238	3.039E-11		0.000E+00	6.733E-28	1.764E-26	5.880E-25	1.181E-23	1.645E-22	4.785E-22	5.032E-22
Ra-226	U-238	9.980E-01		0.000E+00	2.211E-17	5.793E-16	1.931E-14	3.878E-13	5.403E-12	1.572E-11	1.653E-11
Ra-226	U-238	1.317E-06		0.000E+00	2.919E-23	7.646E-22	2.549E-20	5.120E-19	7.132E-18	2.075E-17	2.181E-17
Ra-226	U-238	1.896E-08		0.000E+00	4.201E-25	1.101E-23	3.669E-22	7.369E-21	1.027E-19	2.986E-19	3.140E-19
Ra-226	ΣS(j):			6.997E-03	7.314E-03	7.932E-03	9.943E-03	1.457E-02	2.273E-02	2.631E-02	2.595E-02
0Pb-210	Ra-226	9.996E-01		0.000E+00	2.122E-04	6.004E-04	1.635E-03	2.792E-03	1.528E-03	6.385E-05	7.292E-10

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Ra-226	2.100E-04	0.000E+00	4.457E-08	1.261E-07	3.434E-07	5.865E-07	3.210E-07	1.341E-08	1.532E-13
Pb-210	Ra-226	1.998E-04	0.000E+00	4.240E-08	1.200E-07	3.267E-07	5.580E-07	3.054E-07	1.276E-08	1.457E-13
Pb-210	Ra-226	4.196E-08	0.000E+00	8.906E-12	2.520E-11	6.862E-11	1.172E-10	6.414E-11	2.680E-12	3.061E-17
Pb-210	Ra-226	2.000E-07	0.000E+00	4.245E-11	1.201E-10	3.271E-10	5.587E-10	3.057E-10	1.278E-11	1.459E-16
Pb-210	Th-230	9.996E-01	0.000E+00	6.630E-06	5.740E-05	5.582E-04	3.501E-03	1.353E-02	1.930E-02	1.916E-02
Pb-210	Th-230	2.100E-04	0.000E+00	1.393E-09	1.206E-08	1.172E-07	7.354E-07	2.843E-06	4.053E-06	4.025E-06
Pb-210	Th-230	1.998E-04	0.000E+00	1.325E-09	1.147E-08	1.115E-07	6.997E-07	2.705E-06	3.856E-06	3.830E-06
Pb-210	Th-230	4.196E-08	0.000E+00	2.783E-13	2.409E-12	2.343E-11	1.470E-10	5.681E-10	8.099E-10	8.044E-10
Pb-210	Th-230	2.000E-07	0.000E+00	1.327E-12	1.148E-11	1.117E-10	7.005E-10	2.708E-09	3.861E-09	3.834E-09
Pb-210	U-234	9.996E-01	0.000E+00	2.437E-13	6.321E-12	2.037E-10	3.740E-09	4.119E-08	9.371E-08	9.567E-08
Pb-210	U-234	2.100E-04	0.000E+00	5.119E-17	1.328E-15	4.278E-14	7.856E-13	8.652E-12	1.968E-11	2.010E-11
Pb-210	U-234	1.998E-04	0.000E+00	4.870E-17	1.263E-15	4.070E-14	7.474E-13	8.231E-12	1.873E-11	1.912E-11
Pb-210	U-234	4.196E-08	0.000E+00	1.023E-20	2.653E-19	8.549E-18	1.570E-16	1.729E-15	3.934E-15	4.016E-15
Pb-210	U-234	2.000E-07	0.000E+00	4.876E-20	1.265E-18	4.075E-17	7.483E-16	8.241E-15	1.875E-14	1.914E-14
Pb-210	U-238	1.599E-03	0.000E+00	2.751E-22	2.139E-20	2.290E-18	1.244E-16	4.175E-15	1.799E-14	1.956E-14
Pb-210	U-238	3.359E-07	0.000E+00	5.779E-26	4.492E-24	4.809E-22	2.613E-20	8.770E-19	3.778E-18	4.108E-18
Pb-210	U-238	3.196E-07	0.000E+00	5.498E-26	4.274E-24	4.576E-22	2.486E-20	8.344E-19	3.595E-18	3.908E-18
Pb-210	U-238	6.713E-11	0.000E+00	1.155E-29	8.978E-28	9.611E-26	5.222E-24	1.753E-22	7.550E-22	8.209E-22
Pb-210	U-238	3.200E-10	0.000E+00	5.504E-29	4.279E-27	4.581E-25	2.489E-23	8.354E-22	3.599E-21	3.913E-21
Pb-210	U-238	9.980E-01	0.000E+00	1.717E-19	1.335E-17	1.429E-15	7.763E-14	2.605E-12	1.122E-11	1.220E-11
Pb-210	U-238	2.096E-04	0.000E+00	3.606E-23	2.803E-21	3.001E-19	1.631E-17	5.472E-16	2.358E-15	2.563E-15
Pb-210	U-238	1.994E-04	0.000E+00	3.431E-23	2.667E-21	2.855E-19	1.551E-17	5.207E-16	2.243E-15	2.439E-15
Pb-210	U-238	4.189E-08	0.000E+00	7.206E-27	5.602E-25	5.997E-23	3.259E-21	1.094E-19	4.711E-19	5.122E-19
Pb-210	U-238	1.997E-07	0.000E+00	3.435E-26	2.670E-24	2.859E-22	1.553E-20	5.213E-19	2.246E-18	2.442E-18
Pb-210	ΣS(j):		0.000E+00	2.189E-04	6.581E-04	2.194E-03	6.296E-03	1.507E-02	1.937E-02	1.917E-02
0Ra-226	Ra-226	1.899E-08	1.329E-10	1.308E-10	1.266E-10	1.130E-10	8.163E-11	2.616E-11	1.013E-12	1.156E-17
Ra-226	Ra-226	2.100E-04	1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.024E-07	2.892E-07	1.119E-08	1.278E-13
Ra-226	ΣS(j):		1.470E-06	1.446E-06	1.400E-06	1.249E-06	9.025E-07	2.892E-07	1.120E-08	1.278E-13
0Pb-210	Ra-226	1.899E-08	0.000E+00	4.031E-12	1.141E-11	3.106E-11	5.306E-11	2.903E-11	1.213E-12	1.385E-17
Pb-210	Ra-226	3.989E-12	0.000E+00	8.467E-16	2.396E-15	6.524E-15	1.114E-14	6.098E-15	2.548E-16	2.910E-21
Pb-210	Ra-226	3.795E-12	0.000E+00	8.056E-16	2.280E-15	6.207E-15	1.060E-14	5.802E-15	2.424E-16	2.769E-21
Pb-210	Ra-226	7.972E-16	0.000E+00	1.692E-19	4.789E-19	1.304E-18	2.227E-18	1.219E-18	5.092E-20	5.816E-25
Pb-210	Ra-226	3.800E-15	0.000E+00	8.066E-19	2.283E-18	6.214E-18	1.062E-17	5.809E-18	2.427E-19	2.772E-24
Pb-210	Th-230	1.899E-08	0.000E+00	1.260E-13	1.091E-12	1.061E-11	6.652E-11	2.572E-10	3.666E-10	3.641E-10
Pb-210	Th-230	3.989E-12	0.000E+00	2.646E-17	2.291E-16	2.228E-15	1.397E-14	5.401E-14	7.701E-14	7.648E-14
Pb-210	Th-230	3.795E-12	0.000E+00	2.517E-17	2.179E-16	2.119E-15	1.329E-14	5.139E-14	7.326E-14	7.276E-14
Pb-210	Th-230	7.972E-16	0.000E+00	5.287E-21	4.578E-20	4.452E-19	2.792E-18	1.079E-17	1.539E-17	1.528E-17
Pb-210	Th-230	3.800E-15	0.000E+00	2.520E-20	2.182E-19	2.122E-18	1.331E-17	5.145E-17	7.335E-17	7.285E-17
Pb-210	U-234	1.899E-08	0.000E+00	4.630E-21	1.201E-19	3.870E-18	7.106E-17	7.826E-16	1.781E-15	1.818E-15
Pb-210	U-234	3.989E-12	0.000E+00	9.725E-25	2.522E-23	8.128E-22	1.493E-20	1.644E-19	3.740E-19	3.818E-19
Pb-210	U-234	3.795E-12	0.000E+00	9.253E-25	2.400E-23	7.734E-22	1.420E-20	1.564E-19	3.558E-19	3.633E-19
Pb-210	U-234	7.972E-16	0.000E+00	1.944E-28	5.041E-27	1.624E-25	2.983E-24	3.285E-23	7.474E-23	7.630E-23
Pb-210	U-234	3.800E-15	0.000E+00	9.264E-28	2.403E-26	7.743E-25	1.422E-23	1.566E-22	3.563E-22	3.637E-22
Pb-210	U-238	3.039E-11	0.000E+00	5.227E-30	4.064E-28	4.350E-26	2.364E-24	7.933E-23	3.418E-22	3.716E-22
Pb-210	U-238	6.383E-15	0.000E+00	1.098E-33	8.536E-32	9.137E-30	4.965E-28	1.666E-26	7.178E-26	7.805E-26
Pb-210	U-238	6.073E-15	0.000E+00	1.045E-33	8.121E-32	8.694E-30	4.724E-28	1.585E-26	6.830E-26	7.426E-26
Pb-210	U-238	1.276E-18	0.000E+00	2.194E-37	1.706E-35	1.826E-33	9.922E-32	3.330E-30	1.435E-29	1.560E-29

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	U-238	6.080E-18	0.000E+00	1.046E-36	8.131E-35	8.704E-33	4.730E-31	1.587E-29	6.838E-29	7.435E-29
Pb-210	U-238	1.896E-08	0.000E+00	3.262E-27	2.536E-25	2.715E-23	1.475E-21	4.950E-20	2.133E-19	2.319E-19
Pb-210	U-238	3.983E-12	0.000E+00	6.851E-31	5.326E-29	5.702E-27	3.098E-25	1.040E-23	4.479E-23	4.870E-23
Pb-210	U-238	3.789E-12	0.000E+00	6.518E-31	5.068E-29	5.425E-27	2.948E-25	9.893E-24	4.262E-23	4.634E-23
Pb-210	U-238	7.959E-16	0.000E+00	1.369E-34	1.064E-32	1.139E-30	6.191E-29	2.078E-27	8.951E-27	9.732E-27
Pb-210	U-238	3.794E-15	0.000E+00	6.526E-34	5.074E-32	5.431E-30	2.951E-28	9.904E-27	4.267E-26	4.639E-26
Pb-210	ΣS(j):		0.000E+00	4.159E-12	1.250E-11	4.168E-11	1.196E-10	2.863E-10	3.680E-10	3.643E-10
0Ra-226	Ra-226	2.771E-10	1.940E-12	1.909E-12	1.848E-12	1.649E-12	1.191E-12	3.817E-13	1.478E-14	1.687E-19
Ra-226	Ra-226	3.989E-12	2.792E-14	2.747E-14	2.660E-14	2.373E-14	1.715E-14	5.494E-15	2.127E-16	2.428E-21
Ra-226	ΣS(j):		1.968E-12	1.936E-12	1.874E-12	1.673E-12	1.208E-12	3.872E-13	1.499E-14	1.711E-19
0Ra-226	Ra-226	1.998E-04	1.398E-06	1.376E-06	1.332E-06	1.188E-06	8.586E-07	2.751E-07	1.065E-08	1.216E-13
Ra-226	Ra-226	2.637E-10	1.846E-12	1.816E-12	1.758E-12	1.569E-12	1.133E-12	3.632E-13	1.406E-14	1.605E-19
Ra-226	Th-230	1.998E-04	0.000E+00	8.584E-08	2.534E-07	7.986E-07	2.054E-06	4.268E-06	5.247E-06	5.186E-06
Ra-226	Th-230	2.637E-10	0.000E+00	1.133E-13	3.345E-13	1.054E-12	2.711E-12	5.634E-12	6.926E-12	6.846E-12
Ra-226	Th-230	3.795E-12	0.000E+00	1.631E-15	4.814E-15	1.517E-14	3.902E-14	8.109E-14	9.970E-14	9.854E-14
Ra-226	U-234	1.998E-04	0.000E+00	4.714E-15	4.136E-14	4.205E-13	2.956E-12	1.488E-11	2.573E-11	2.589E-11
Ra-226	U-234	2.637E-10	0.000E+00	6.222E-21	5.459E-20	5.551E-19	3.902E-18	1.964E-17	3.397E-17	3.418E-17
Ra-226	U-234	3.795E-12	0.000E+00	8.956E-23	7.858E-22	7.990E-21	5.616E-20	2.827E-19	4.889E-19	4.919E-19
Ra-226	U-238	3.196E-07	0.000E+00	7.082E-24	1.855E-22	6.185E-21	1.242E-19	1.730E-18	5.033E-18	5.293E-18
Ra-226	U-238	4.219E-13	0.000E+00	9.348E-30	2.449E-28	8.164E-27	1.640E-25	2.284E-24	6.644E-24	6.986E-24
Ra-226	U-238	6.073E-15	0.000E+00	1.346E-31	3.525E-30	1.175E-28	2.360E-27	3.288E-26	9.563E-26	1.006E-25
Ra-226	U-238	1.994E-04	0.000E+00	4.419E-21	1.158E-19	3.859E-18	7.751E-17	1.080E-15	3.141E-15	3.303E-15
Ra-226	U-238	2.633E-10	0.000E+00	5.833E-27	1.528E-25	5.094E-24	1.023E-22	1.425E-21	4.146E-21	4.359E-21
Ra-226	U-238	3.789E-12	0.000E+00	8.396E-29	2.199E-27	7.333E-26	1.473E-24	2.051E-23	5.967E-23	6.275E-23
Ra-226	ΣS(j):		1.398E-06	1.462E-06	1.585E-06	1.987E-06	2.912E-06	4.543E-06	5.258E-06	5.186E-06
0Ra-226	Ra-226	3.795E-12	2.657E-14	2.614E-14	2.530E-14	2.258E-14	1.631E-14	5.227E-15	2.024E-16	2.310E-21
Ra-226	Ra-226	4.196E-08	2.937E-10	2.890E-10	2.797E-10	2.496E-10	1.803E-10	5.779E-11	2.237E-12	2.554E-17
Ra-226	ΣS(j):		2.937E-10	2.890E-10	2.797E-10	2.497E-10	1.804E-10	5.779E-11	2.237E-12	2.554E-17
0Ra-226	Ra-226	5.538E-14	3.877E-16	3.814E-16	3.692E-16	3.295E-16	2.380E-16	7.628E-17	2.953E-18	3.371E-23
Ra-226	Ra-226	7.972E-16	5.580E-18	5.490E-18	5.315E-18	4.743E-18	3.426E-18	1.098E-18	4.251E-20	4.852E-25
Ra-226	ΣS(j):		3.933E-16	3.869E-16	3.746E-16	3.343E-16	2.415E-16	7.738E-17	2.996E-18	3.420E-23
0Ra-226	Ra-226	2.000E-07	1.400E-09	1.377E-09	1.333E-09	1.190E-09	8.596E-10	2.755E-10	1.066E-11	1.217E-16
Ra-226	Ra-226	2.640E-13	1.848E-15	1.818E-15	1.760E-15	1.571E-15	1.135E-15	3.636E-16	1.408E-17	1.607E-22
Ra-226	Th-230	2.000E-07	0.000E+00	8.594E-11	2.537E-10	7.996E-10	2.056E-09	4.273E-09	5.254E-09	5.192E-09
Ra-226	Th-230	2.640E-13	0.000E+00	1.134E-16	3.349E-16	1.055E-15	2.714E-15	5.641E-15	6.935E-15	6.854E-15
Ra-226	Th-230	3.800E-15	0.000E+00	1.633E-18	4.820E-18	1.519E-17	3.907E-17	8.119E-17	9.982E-17	9.866E-17
Ra-226	U-234	2.000E-07	0.000E+00	4.720E-18	4.141E-17	4.210E-16	2.959E-15	1.490E-14	2.576E-14	2.592E-14
Ra-226	U-234	2.640E-13	0.000E+00	6.230E-24	5.466E-23	5.558E-22	3.906E-21	1.966E-20	3.401E-20	3.422E-20
Ra-226	U-234	3.800E-15	0.000E+00	8.967E-26	7.867E-25	8.000E-24	5.623E-23	2.830E-22	4.895E-22	4.925E-22
Ra-226	U-238	3.200E-10	0.000E+00	7.090E-27	1.857E-25	6.192E-24	1.244E-22	1.732E-21	5.039E-21	5.299E-21
Ra-226	U-238	4.224E-16	0.000E+00	9.359E-33	2.452E-31	8.174E-30	1.642E-28	2.287E-27	6.652E-27	6.995E-27
Ra-226	U-238	6.080E-18	0.000E+00	1.347E-34	3.529E-33	1.177E-31	2.363E-30	3.292E-29	9.575E-29	1.007E-28
Ra-226	U-238	1.997E-07	0.000E+00	4.424E-24	1.159E-22	3.864E-21	7.760E-20	1.081E-18	3.145E-18	3.307E-18
Ra-226	U-238	2.636E-13	0.000E+00	5.840E-30	1.530E-28	5.100E-27	1.024E-25	1.427E-24	4.151E-24	4.365E-24

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-238	3.794E-15	0.000E+00	8.406E-32	2.202E-30	7.342E-29	1.474E-27	2.054E-26	5.975E-26	6.282E-26
Ra-226	ΣS(j):		1.400E-09	1.463E-09	1.587E-09	1.989E-09	2.916E-09	4.549E-09	5.264E-09	5.193E-09
0Ra-226	Ra-226	3.800E-15	2.660E-17	2.617E-17	2.533E-17	2.261E-17	1.633E-17	5.234E-18	2.026E-19	2.313E-24
0Ra-228	Ra-228	1.000E+00	3.600E-04	3.141E-04	2.391E-04	9.205E-05	6.019E-06	4.303E-10	6.146E-22	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	1.127E-04	2.968E-04	6.579E-04	8.688E-04	8.824E-04	8.792E-04	8.679E-04
Ra-228	ΣS(j):		3.600E-04	4.268E-04	5.359E-04	7.499E-04	8.748E-04	8.824E-04	8.792E-04	8.679E-04
0Th-228	Ra-228	1.000E+00	0.000E+00	1.019E-04	1.888E-04	1.322E-04	9.636E-06	6.896E-10	9.851E-22	0.000E+00
Th-228	Th-228	1.000E+00	1.000E-03	6.959E-04	3.369E-04	2.662E-05	1.886E-08	1.785E-19	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	1.856E-05	1.224E-04	5.358E-04	8.599E-04	8.824E-04	8.792E-04	8.679E-04
Th-228	ΣS(j):		1.000E-03	8.163E-04	6.482E-04	6.946E-04	8.696E-04	8.824E-04	8.792E-04	8.679E-04
0Th-230	Th-230	9.996E-01	9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
Th-230	Th-230	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.319E-06	1.318E-06	1.316E-06	1.309E-06	1.283E-06
Th-230	U-234	9.996E-01	0.000E+00	1.091E-07	3.201E-07	9.893E-07	2.417E-06	4.431E-06	4.942E-06	4.854E-06
Th-230	U-234	1.319E-06	0.000E+00	1.440E-13	4.226E-13	1.306E-12	3.190E-12	5.849E-12	6.524E-12	6.407E-12
Th-230	U-234	1.899E-08	0.000E+00	2.073E-15	6.083E-15	1.880E-14	4.592E-14	8.418E-14	9.391E-14	9.222E-14
Th-230	U-234	2.100E-04	0.000E+00	2.291E-11	6.724E-11	2.078E-10	5.077E-10	9.306E-10	1.038E-09	1.020E-09
Th-230	U-234	2.771E-10	0.000E+00	3.025E-17	8.876E-17	2.743E-16	6.701E-16	1.228E-15	1.370E-15	1.346E-15
Th-230	U-234	3.989E-12	0.000E+00	4.353E-19	1.278E-18	3.948E-18	9.646E-18	1.768E-17	1.972E-17	1.937E-17
Th-230	U-234	1.998E-04	0.000E+00	2.180E-11	6.398E-11	1.977E-10	4.830E-10	8.854E-10	9.877E-10	9.700E-10
Th-230	U-234	2.637E-10	0.000E+00	2.878E-17	8.445E-17	2.610E-16	6.376E-16	1.169E-15	1.304E-15	1.280E-15
Th-230	U-234	3.795E-12	0.000E+00	4.142E-19	1.216E-18	3.756E-18	9.177E-18	1.682E-17	1.877E-17	1.843E-17
Th-230	U-234	4.196E-08	0.000E+00	4.579E-15	1.344E-14	4.153E-14	1.015E-13	1.860E-13	2.075E-13	2.037E-13
Th-230	U-234	5.538E-14	0.000E+00	6.044E-21	1.774E-20	5.482E-20	1.339E-19	2.455E-19	2.738E-19	2.689E-19
Th-230	U-234	7.972E-16	0.000E+00	8.700E-23	2.553E-22	7.890E-22	1.928E-21	3.534E-21	3.942E-21	3.871E-21
Th-230	U-234	2.000E-07	0.000E+00	2.183E-14	6.405E-14	1.979E-13	4.836E-13	8.865E-13	9.889E-13	9.712E-13
Th-230	U-234	2.640E-13	0.000E+00	2.881E-20	8.455E-20	2.613E-19	6.383E-19	1.170E-18	1.305E-18	1.282E-18
Th-230	U-234	3.800E-15	0.000E+00	4.147E-22	1.217E-21	3.761E-21	9.188E-21	1.684E-20	1.879E-20	1.845E-20
Th-230	U-238	1.599E-03	0.000E+00	2.455E-16	2.145E-15	2.152E-14	1.458E-13	6.591E-13	1.001E-12	9.922E-13
Th-230	U-238	2.111E-09	0.000E+00	3.240E-22	2.832E-21	2.841E-20	1.925E-19	8.700E-19	1.322E-18	1.310E-18
Th-230	U-238	3.039E-11	0.000E+00	4.664E-24	4.076E-23	4.090E-22	2.770E-21	1.252E-20	1.903E-20	1.885E-20
Th-230	U-238	3.359E-07	0.000E+00	5.156E-20	4.506E-19	4.521E-18	3.063E-17	1.384E-16	2.103E-16	2.084E-16
Th-230	U-238	4.434E-13	0.000E+00	6.806E-26	5.948E-25	5.968E-24	4.043E-23	1.827E-22	2.777E-22	2.751E-22
Th-230	U-238	6.383E-15	0.000E+00	9.797E-28	8.562E-27	8.590E-26	5.819E-25	2.630E-24	3.997E-24	3.960E-24
Th-230	U-238	3.196E-07	0.000E+00	4.906E-20	4.287E-19	4.301E-18	2.914E-17	1.317E-16	2.001E-16	1.983E-16
Th-230	U-238	4.219E-13	0.000E+00	6.476E-26	5.659E-25	5.678E-24	3.846E-23	1.739E-22	2.642E-22	2.617E-22
Th-230	U-238	6.073E-15	0.000E+00	9.321E-28	8.146E-27	8.173E-26	5.537E-25	2.502E-24	3.802E-24	3.767E-24
Th-230	U-238	6.713E-11	0.000E+00	1.030E-23	9.005E-23	9.035E-22	6.121E-21	2.766E-20	4.204E-20	4.165E-20
Th-230	U-238	8.862E-17	0.000E+00	1.360E-29	1.189E-28	1.193E-27	8.079E-27	3.652E-26	5.549E-26	5.497E-26
Th-230	U-238	1.276E-18	0.000E+00	1.958E-31	1.711E-30	1.717E-29	1.163E-28	5.256E-28	7.987E-28	7.913E-28
Th-230	U-238	3.200E-10	0.000E+00	4.912E-23	4.292E-22	4.307E-21	2.917E-20	1.319E-19	2.004E-19	1.985E-19
Th-230	U-238	4.224E-16	0.000E+00	6.484E-29	5.666E-28	5.685E-27	3.851E-26	1.741E-25	2.645E-25	2.620E-25
Th-230	U-238	6.080E-18	0.000E+00	9.332E-31	8.156E-30	8.182E-29	5.543E-28	2.505E-27	3.807E-27	3.772E-27
Th-230	U-238	9.980E-01	0.000E+00	1.532E-13	1.339E-12	1.343E-11	9.099E-11	4.113E-10	6.249E-10	6.191E-10
Th-230	U-238	1.317E-06	0.000E+00	2.022E-19	1.767E-18	1.773E-17	1.201E-16	5.429E-16	8.249E-16	8.173E-16
Th-230	U-238	1.896E-08	0.000E+00	2.911E-21	2.544E-20	2.552E-19	1.729E-18	7.814E-18	1.187E-17	1.176E-17

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Th-230	U-238	2.096E-04	0.000E+00	3.218E-17	2.812E-16	2.821E-15	1.911E-14	8.638E-14	1.313E-13	1.300E-13
Th-230	U-238	2.767E-10	0.000E+00	4.247E-23	3.712E-22	3.724E-21	2.523E-20	1.140E-19	1.733E-19	1.717E-19
Th-230	U-238	3.983E-12	0.000E+00	6.113E-25	5.343E-24	5.360E-23	3.631E-22	1.641E-21	2.494E-21	2.471E-21
Th-230	U-238	1.994E-04	0.000E+00	3.061E-17	2.675E-16	2.684E-15	1.818E-14	8.219E-14	1.249E-13	1.237E-13
Th-230	U-238	2.633E-10	0.000E+00	4.041E-23	3.531E-22	3.543E-21	2.400E-20	1.085E-19	1.648E-19	1.633E-19
Th-230	U-238	3.789E-12	0.000E+00	5.816E-25	5.083E-24	5.100E-23	3.455E-22	1.562E-21	2.373E-21	2.351E-21
Th-230	U-238	4.189E-08	0.000E+00	6.430E-21	5.619E-20	5.638E-19	3.819E-18	1.726E-17	2.623E-17	2.599E-17
Th-230	U-238	5.530E-14	0.000E+00	8.488E-27	7.417E-26	7.442E-25	5.041E-24	2.279E-23	3.462E-23	3.430E-23
Th-230	U-238	7.959E-16	0.000E+00	1.222E-28	1.068E-27	1.071E-26	7.257E-26	3.280E-25	4.984E-25	4.938E-25
Th-230	U-238	1.997E-07	0.000E+00	3.065E-20	2.678E-19	2.687E-18	1.821E-17	8.229E-17	1.250E-16	1.239E-16
Th-230	U-238	2.636E-13	0.000E+00	4.046E-26	3.536E-25	3.547E-24	2.403E-23	1.086E-22	1.650E-22	1.635E-22
Th-230	U-238	3.794E-15	0.000E+00	5.823E-28	5.089E-27	5.106E-26	3.459E-25	1.563E-24	2.376E-24	2.354E-24
Th-230	ΣS(j):		9.996E-01	9.996E-01	9.995E-01	9.993E-01	9.988E-01	9.968E-01	9.913E-01	9.723E-01
0Th-230	Th-230	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.899E-08	1.898E-08	1.894E-08	1.883E-08	1.847E-08
Th-230	Th-230	2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
Th-230	ΣS(j):		2.100E-04	2.100E-04	2.100E-04	2.099E-04	2.098E-04	2.094E-04	2.082E-04	2.042E-04
0Ra-226	Th-230	2.100E-04	0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
Ra-226	Th-230	3.989E-12	0.000E+00	1.714E-15	5.060E-15	1.595E-14	4.101E-14	8.523E-14	1.048E-13	1.036E-13
Ra-226	U-234	2.100E-04	0.000E+00	4.955E-15	4.347E-14	4.420E-13	3.107E-12	1.564E-11	2.705E-11	2.721E-11
Ra-226	U-234	2.771E-10	0.000E+00	6.540E-21	5.738E-20	5.834E-19	4.101E-18	2.064E-17	3.570E-17	3.592E-17
Ra-226	U-234	3.989E-12	0.000E+00	9.414E-23	8.259E-22	8.398E-21	5.903E-20	2.971E-19	5.139E-19	5.171E-19
Ra-226	U-238	3.359E-07	0.000E+00	7.443E-24	1.950E-22	6.501E-21	1.306E-19	1.819E-18	5.290E-18	5.563E-18
Ra-226	U-238	4.434E-13	0.000E+00	9.825E-30	2.574E-28	8.581E-27	1.723E-25	2.401E-24	6.983E-24	7.343E-24
Ra-226	U-238	6.383E-15	0.000E+00	1.414E-31	3.705E-30	1.235E-28	2.480E-27	3.455E-26	1.005E-25	1.057E-25
Ra-226	U-238	2.096E-04	0.000E+00	4.645E-21	1.217E-19	4.056E-18	8.146E-17	1.135E-15	3.301E-15	3.471E-15
Ra-226	U-238	2.767E-10	0.000E+00	6.131E-27	1.606E-25	5.354E-24	1.075E-22	1.498E-21	4.357E-21	4.582E-21
Ra-226	U-238	3.983E-12	0.000E+00	8.825E-29	2.312E-27	7.707E-26	1.548E-24	2.156E-23	6.272E-23	6.595E-23
Ra-226	ΣS(j):		0.000E+00	9.022E-08	2.663E-07	8.394E-07	2.158E-06	4.486E-06	5.515E-06	5.451E-06
0Th-230	Th-230	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.771E-10	2.769E-10	2.764E-10	2.748E-10	2.696E-10
Th-230	Th-230	3.989E-12	3.989E-12	3.989E-12	3.989E-12	3.988E-12	3.986E-12	3.978E-12	3.956E-12	3.880E-12
Th-230	ΣS(j):		2.811E-10	2.811E-10	2.811E-10	2.811E-10	2.809E-10	2.804E-10	2.788E-10	2.734E-10
0Ra-226	Th-230	2.771E-10	0.000E+00	1.191E-13	3.515E-13	1.108E-12	2.849E-12	5.922E-12	7.280E-12	7.195E-12
0Th-230	Th-230	1.998E-04	1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
Th-230	Th-230	2.637E-10	2.637E-10	2.637E-10	2.637E-10	2.636E-10	2.635E-10	2.630E-10	2.615E-10	2.565E-10
Th-230	ΣS(j):		1.998E-04	1.998E-04	1.997E-04	1.997E-04	1.996E-04	1.992E-04	1.981E-04	1.943E-04
0Th-230	Th-230	3.795E-12	3.795E-12	3.795E-12	3.795E-12	3.794E-12	3.792E-12	3.785E-12	3.764E-12	3.692E-12
Th-230	Th-230	4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.195E-08	4.192E-08	4.184E-08	4.161E-08	4.081E-08
Th-230	ΣS(j):		4.196E-08	4.196E-08	4.196E-08	4.195E-08	4.193E-08	4.185E-08	4.161E-08	4.081E-08
0Ra-226	Th-230	4.196E-08	0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
Ra-226	Th-230	7.972E-16	0.000E+00	3.426E-19	1.011E-18	3.187E-18	8.196E-18	1.703E-17	2.094E-17	2.070E-17
Ra-226	U-234	4.196E-08	0.000E+00	9.901E-19	8.686E-18	8.833E-17	6.209E-16	3.125E-15	5.405E-15	5.438E-15
Ra-226	U-234	5.538E-14	0.000E+00	1.307E-24	1.147E-23	1.166E-22	8.195E-22	4.125E-21	7.134E-21	7.179E-21

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-226	U-234	7.972E-16	0.000E+00	1.881E-26	1.650E-25	1.678E-24	1.180E-23	5.938E-23	1.027E-22	1.033E-22
Ra-226	U-238	6.713E-11	0.000E+00	1.487E-27	3.897E-26	1.299E-24	2.609E-23	3.634E-22	1.057E-21	1.112E-21
Ra-226	U-238	8.862E-17	0.000E+00	1.963E-33	5.144E-32	1.715E-30	3.444E-29	4.797E-28	1.395E-27	1.467E-27
Ra-226	U-238	1.276E-18	0.000E+00	2.826E-35	7.404E-34	2.468E-32	4.957E-31	6.905E-30	2.009E-29	2.112E-29
Ra-226	U-238	4.189E-08	0.000E+00	9.282E-25	2.431E-23	8.106E-22	1.628E-20	2.268E-19	6.597E-19	6.937E-19
Ra-226	U-238	5.530E-14	0.000E+00	1.225E-30	3.210E-29	1.070E-27	2.149E-26	2.994E-25	8.708E-25	9.157E-25
Ra-226	U-238	7.959E-16	0.000E+00	1.764E-32	4.620E-31	1.540E-29	3.093E-28	4.309E-27	1.253E-26	1.318E-26
Ra-226	ΣS(j):		0.000E+00	1.803E-11	5.322E-11	1.677E-10	4.314E-10	8.965E-10	1.102E-09	1.089E-09
0Th-230	Th-230	5.538E-14	5.538E-14	5.538E-14	5.538E-14	5.537E-14	5.534E-14	5.523E-14	5.493E-14	5.387E-14
Th-230	Th-230	7.972E-16	7.972E-16	7.972E-16	7.971E-16	7.970E-16	7.965E-16	7.950E-16	7.906E-16	7.754E-16
Th-230	ΣS(j):		5.618E-14	5.618E-14	5.618E-14	5.617E-14	5.614E-14	5.603E-14	5.572E-14	5.465E-14
0Ra-226	Th-230	5.538E-14	0.000E+00	2.380E-17	7.025E-17	2.214E-16	5.694E-16	1.183E-15	1.455E-15	1.438E-15
0Th-230	Th-230	2.000E-07	2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
Th-230	Th-230	2.640E-13	2.640E-13	2.640E-13	2.640E-13	2.639E-13	2.638E-13	2.633E-13	2.618E-13	2.568E-13
Th-230	ΣS(j):		2.000E-07	2.000E-07	2.000E-07	1.999E-07	1.998E-07	1.994E-07	1.983E-07	1.945E-07
0Th-230	Th-230	3.800E-15	3.800E-15	3.800E-15	3.800E-15	3.799E-15	3.797E-15	3.789E-15	3.769E-15	3.696E-15
0Th-232	Th-232	1.000E+00	1.000E-03	1.000E-03	9.999E-04	9.998E-04	9.994E-04	9.981E-04	9.945E-04	9.817E-04
0U-234	U-234	9.996E-01	1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.175E-03	1.312E-03	1.569E-05	2.937E-12
U-234	U-234	1.319E-06	1.583E-08	1.549E-08	1.482E-08	1.269E-08	8.152E-09	1.732E-09	2.071E-11	3.877E-18
U-234	U-238	1.599E-03	0.000E+00	5.300E-11	1.521E-10	4.343E-10	8.370E-10	5.927E-10	2.128E-11	1.329E-17
U-234	U-238	2.111E-09	0.000E+00	6.996E-17	2.008E-16	5.733E-16	1.105E-15	7.824E-16	2.808E-17	1.754E-23
U-234	U-238	3.039E-11	0.000E+00	1.007E-18	2.890E-18	8.252E-18	1.590E-17	1.126E-17	4.042E-19	2.524E-25
U-234	U-238	3.359E-07	0.000E+00	1.113E-14	3.195E-14	9.122E-14	1.758E-13	1.245E-13	4.469E-15	2.791E-21
U-234	U-238	4.434E-13	0.000E+00	1.470E-20	4.218E-20	1.204E-19	2.321E-19	1.643E-19	5.899E-21	3.684E-27
U-234	U-238	6.383E-15	0.000E+00	2.115E-22	6.071E-22	1.733E-21	3.340E-21	2.365E-21	8.491E-23	5.302E-29
U-234	U-238	3.196E-07	0.000E+00	1.059E-14	3.040E-14	8.679E-14	1.673E-13	1.184E-13	4.252E-15	2.655E-21
U-234	U-238	4.219E-13	0.000E+00	1.398E-20	4.013E-20	1.146E-19	2.208E-19	1.564E-19	5.612E-21	3.505E-27
U-234	U-238	6.073E-15	0.000E+00	2.012E-22	5.776E-22	1.649E-21	3.178E-21	2.251E-21	8.078E-23	5.045E-29
U-234	U-238	6.713E-11	0.000E+00	2.225E-18	6.385E-18	1.823E-17	3.513E-17	2.488E-17	8.930E-19	5.577E-25
U-234	U-238	8.862E-17	0.000E+00	2.937E-24	8.429E-24	2.406E-23	4.637E-23	3.284E-23	1.179E-24	7.362E-31
U-234	U-238	1.276E-18	0.000E+00	4.227E-26	1.213E-25	3.464E-25	6.675E-25	4.727E-25	1.697E-26	1.060E-32
U-234	U-238	3.200E-10	0.000E+00	1.060E-17	3.044E-17	8.690E-17	1.675E-16	1.186E-16	4.257E-18	2.658E-24
U-234	U-238	4.224E-16	0.000E+00	1.400E-23	4.018E-23	1.147E-22	2.210E-22	1.565E-22	5.619E-24	3.509E-30
U-234	U-238	6.080E-18	0.000E+00	2.015E-25	5.783E-25	1.651E-24	3.182E-24	2.253E-24	8.088E-26	5.051E-32
U-234	U-238	9.980E-01	0.000E+00	3.307E-08	9.492E-08	2.710E-07	5.223E-07	3.699E-07	1.328E-08	8.291E-15
U-234	U-238	1.317E-06	0.000E+00	4.366E-14	1.253E-13	3.577E-13	6.894E-13	4.882E-13	1.752E-14	1.094E-20
U-234	U-238	1.896E-08	0.000E+00	6.284E-16	1.804E-15	5.149E-15	9.923E-15	7.027E-15	2.522E-16	1.575E-22
U-234	U-238	2.096E-04	0.000E+00	6.947E-12	1.994E-11	5.692E-11	1.097E-10	7.769E-11	2.788E-12	1.741E-18
U-234	U-238	2.767E-10	0.000E+00	9.170E-18	2.632E-17	7.514E-17	1.448E-16	1.025E-16	3.681E-18	2.299E-24
U-234	U-238	3.983E-12	0.000E+00	1.320E-19	3.788E-19	1.082E-18	2.084E-18	1.476E-18	5.298E-20	3.309E-26
U-234	U-238	1.994E-04	0.000E+00	6.609E-12	1.897E-11	5.416E-11	1.044E-10	7.391E-11	2.653E-12	1.657E-18
U-234	U-238	2.633E-10	0.000E+00	8.724E-18	2.504E-17	7.149E-17	1.378E-16	9.756E-17	3.502E-18	2.187E-24
U-234	U-238	3.789E-12	0.000E+00	1.256E-19	3.604E-19	1.029E-18	1.983E-18	1.404E-18	5.041E-20	3.148E-26

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Summary : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-238	4.189E-08	0.000E+00	1.388E-15	3.984E-15	1.138E-14	2.192E-14	1.552E-14	5.573E-16	3.480E-22
U-234	U-238	5.530E-14	0.000E+00	1.832E-21	5.259E-21	1.502E-20	2.894E-20	2.049E-20	7.356E-22	4.594E-28
U-234	U-238	7.959E-16	0.000E+00	2.638E-23	7.570E-23	2.161E-22	4.165E-22	2.950E-22	1.059E-23	6.612E-30
U-234	U-238	1.997E-07	0.000E+00	6.617E-15	1.899E-14	5.422E-14	1.045E-13	7.400E-14	2.656E-15	1.659E-21
U-234	U-238	2.636E-13	0.000E+00	8.735E-21	2.507E-20	7.157E-20	1.379E-19	9.768E-20	3.506E-21	2.190E-27
U-234	U-238	3.794E-15	0.000E+00	1.257E-22	3.609E-22	1.030E-21	1.985E-21	1.406E-21	5.047E-23	3.152E-29
U-234	ΣS(j):		1.200E-02	1.173E-02	1.122E-02	9.614E-03	6.176E-03	1.312E-03	1.571E-05	2.945E-12
0U-234	U-234	1.899E-08	2.279E-10	2.229E-10	2.133E-10	1.827E-10	1.173E-10	2.493E-11	2.981E-13	5.580E-20
U-234	U-234	2.100E-04	2.519E-06	2.464E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.169E-16
U-234	ΣS(j):		2.520E-06	2.465E-06	2.358E-06	2.019E-06	1.297E-06	2.756E-07	3.296E-09	6.170E-16
0U-234	U-234	2.771E-10	3.326E-12	3.253E-12	3.112E-12	2.665E-12	1.712E-12	3.637E-13	4.351E-15	8.143E-22
U-234	U-234	3.989E-12	4.787E-14	4.682E-14	4.480E-14	3.837E-14	2.465E-14	5.235E-15	6.262E-17	1.172E-23
U-234	ΣS(j):		3.374E-12	3.300E-12	3.157E-12	2.704E-12	1.737E-12	3.690E-13	4.413E-15	8.260E-22
0U-234	U-234	1.998E-04	2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
U-234	U-234	2.637E-10	3.164E-12	3.095E-12	2.961E-12	2.536E-12	1.629E-12	3.461E-13	4.139E-15	7.748E-22
U-234	ΣS(j):		2.397E-06	2.345E-06	2.243E-06	1.921E-06	1.234E-06	2.622E-07	3.136E-09	5.869E-16
0U-234	U-234	3.795E-12	4.554E-14	4.455E-14	4.262E-14	3.650E-14	2.345E-14	4.981E-15	5.958E-17	1.115E-23
U-234	U-234	4.196E-08	5.035E-10	4.925E-10	4.712E-10	4.035E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
U-234	ΣS(j):		5.035E-10	4.925E-10	4.712E-10	4.036E-10	2.592E-10	5.507E-11	6.587E-13	1.233E-19
0U-234	U-234	5.538E-14	6.646E-16	6.501E-16	6.219E-16	5.327E-16	3.422E-16	7.269E-17	8.694E-19	1.627E-25
U-234	U-234	7.972E-16	9.566E-18	9.357E-18	8.952E-18	7.667E-18	4.925E-18	1.046E-18	1.251E-20	2.342E-27
U-234	ΣS(j):		6.742E-16	6.594E-16	6.309E-16	5.403E-16	3.471E-16	7.373E-17	8.820E-19	1.651E-25
0U-234	U-234	2.000E-07	2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
U-234	U-234	2.640E-13	3.168E-15	3.099E-15	2.965E-15	2.539E-15	1.631E-15	3.465E-16	4.144E-18	7.757E-25
U-234	ΣS(j):		2.400E-09	2.347E-09	2.246E-09	1.924E-09	1.236E-09	2.625E-10	3.140E-12	5.876E-19
0U-234	U-234	3.800E-15	4.560E-17	4.460E-17	4.267E-17	3.655E-17	2.348E-17	4.987E-18	5.965E-20	1.117E-26
0U-235	U-235	9.835E-01	5.114E-04	5.002E-04	4.786E-04	4.099E-04	2.633E-04	5.595E-05	6.696E-07	1.256E-13
U-235	U-235	2.722E-03	1.415E-06	1.384E-06	1.324E-06	1.134E-06	7.288E-07	1.548E-07	1.853E-09	3.475E-16
U-235	ΣS(j):		5.128E-04	5.016E-04	4.799E-04	4.110E-04	2.640E-04	5.610E-05	6.714E-07	1.259E-13
0U-235	U-235	1.376E-02	7.156E-06	6.999E-06	6.696E-06	5.735E-06	3.684E-06	7.828E-07	9.369E-09	1.757E-15
U-235	U-235	3.809E-05	1.980E-08	1.937E-08	1.853E-08	1.587E-08	1.020E-08	2.167E-09	2.593E-11	4.863E-18
U-235	ΣS(j):		7.176E-06	7.019E-06	6.715E-06	5.751E-06	3.695E-06	7.850E-07	9.395E-09	1.762E-15
0U-235	U-235	8.257E-07	4.294E-10	4.200E-10	4.018E-10	3.441E-10	2.211E-10	4.697E-11	5.622E-13	1.054E-19
U-235	U-235	2.285E-09	1.188E-12	1.162E-12	1.112E-12	9.525E-13	6.119E-13	1.300E-13	1.556E-15	2.918E-22
U-235	ΣS(j):		4.306E-10	4.211E-10	4.029E-10	3.451E-10	2.217E-10	4.710E-11	5.637E-13	1.057E-19
0U-238	U-238	5.450E-07	6.540E-09	6.397E-09	6.120E-09	5.242E-09	3.367E-09	7.155E-10	8.563E-12	1.606E-18
U-238	U-238	1.599E-03	1.919E-05	1.877E-05	1.796E-05	1.538E-05	9.882E-06	2.100E-06	2.513E-08	4.713E-15
U-238	ΣS(j):		1.920E-05	1.878E-05	1.797E-05	1.539E-05	9.885E-06	2.100E-06	2.514E-08	4.714E-15

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	2.111E-09	2.533E-11	2.478E-11	2.371E-11	2.030E-11	1.304E-11	2.771E-12	3.317E-14	6.221E-21
U-238	U-238	3.039E-11	3.647E-13	3.567E-13	3.412E-13	2.923E-13	1.878E-13	3.989E-14	4.774E-16	8.954E-23
U-238	ΣS(j):		2.570E-11	2.514E-11	2.405E-11	2.060E-11	1.323E-11	2.811E-12	3.365E-14	6.310E-21
0U-238	U-238	3.359E-07	4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
U-238	U-238	4.434E-13	5.321E-15	5.205E-15	4.979E-15	4.265E-15	2.740E-15	5.821E-16	6.967E-18	1.307E-24
U-238	ΣS(j):		4.031E-09	3.943E-09	3.772E-09	3.231E-09	2.076E-09	4.410E-10	5.278E-12	9.898E-19
0U-238	U-238	6.383E-15	7.659E-17	7.492E-17	7.167E-17	6.139E-17	3.944E-17	8.379E-18	1.003E-19	1.881E-26
U-238	U-238	3.196E-07	3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
U-238	ΣS(j):		3.835E-09	3.751E-09	3.589E-09	3.074E-09	1.975E-09	4.196E-10	5.022E-12	9.418E-19
0U-238	U-238	4.219E-13	5.063E-15	4.952E-15	4.738E-15	4.058E-15	2.607E-15	5.539E-16	6.629E-18	1.243E-24
U-238	U-238	6.073E-15	7.287E-17	7.128E-17	6.819E-17	5.841E-17	3.752E-17	7.972E-18	9.541E-20	1.789E-26
U-238	ΣS(j):		5.136E-15	5.023E-15	4.806E-15	4.116E-15	2.644E-15	5.618E-16	6.724E-18	1.261E-24
0U-238	U-238	6.713E-11	8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
U-238	U-238	8.862E-17	1.063E-18	1.040E-18	9.951E-19	8.523E-19	5.475E-19	1.163E-19	1.392E-21	2.611E-28
U-238	ΣS(j):		8.056E-13	7.880E-13	7.539E-13	6.457E-13	4.148E-13	8.813E-14	1.055E-15	1.978E-22
0U-238	U-238	1.276E-18	1.531E-20	1.497E-20	1.432E-20	1.227E-20	7.881E-21	1.674E-21	2.004E-23	3.758E-30
U-238	U-238	3.200E-10	3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
U-238	ΣS(j):		3.840E-12	3.756E-12	3.593E-12	3.078E-12	1.977E-12	4.201E-13	5.028E-15	9.429E-22
0U-238	U-238	4.224E-16	5.069E-18	4.958E-18	4.743E-18	4.063E-18	2.610E-18	5.545E-19	6.637E-21	1.245E-27
U-238	U-238	6.080E-18	7.296E-20	7.136E-20	6.827E-20	5.848E-20	3.757E-20	7.982E-21	9.553E-23	1.791E-29
U-238	ΣS(j):		5.142E-18	5.029E-18	4.812E-18	4.121E-18	2.647E-18	5.625E-19	6.732E-21	1.263E-27
0U-238	U-238	9.980E-01	1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
U-238	U-238	1.317E-06	1.581E-08	1.546E-08	1.479E-08	1.267E-08	8.139E-09	1.729E-09	2.070E-11	3.882E-18
U-238	ΣS(j):		1.198E-02	1.171E-02	1.121E-02	9.599E-03	6.166E-03	1.310E-03	1.568E-05	2.941E-12
0U-238	U-238	1.896E-08	2.275E-10	2.226E-10	2.129E-10	1.824E-10	1.172E-10	2.489E-11	2.979E-13	5.587E-20
U-238	U-238	2.096E-04	2.515E-06	2.460E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.293E-09	6.177E-16
U-238	ΣS(j):		2.516E-06	2.461E-06	2.354E-06	2.016E-06	1.295E-06	2.752E-07	3.294E-09	6.177E-16
0U-238	U-238	2.767E-10	3.320E-12	3.248E-12	3.107E-12	2.661E-12	1.710E-12	3.632E-13	4.347E-15	8.153E-22
U-238	U-238	3.983E-12	4.779E-14	4.675E-14	4.472E-14	3.831E-14	2.461E-14	5.229E-15	6.258E-17	1.174E-23
U-238	ΣS(j):		3.368E-12	3.294E-12	3.152E-12	2.700E-12	1.734E-12	3.685E-13	4.410E-15	8.270E-22
0U-238	U-238	1.994E-04	2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
U-238	U-238	2.633E-10	3.159E-12	3.090E-12	2.956E-12	2.532E-12	1.627E-12	3.456E-13	4.136E-15	7.757E-22
U-238	ΣS(j):		2.393E-06	2.341E-06	2.240E-06	1.918E-06	1.232E-06	2.618E-07	3.133E-09	5.877E-16
0U-238	U-238	3.789E-12	4.547E-14	4.448E-14	4.255E-14	3.645E-14	2.341E-14	4.975E-15	5.954E-17	1.117E-23
U-238	U-238	4.189E-08	5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.499E-11	6.582E-13	1.234E-19
U-238	ΣS(j):		5.027E-10	4.917E-10	4.704E-10	4.029E-10	2.588E-10	5.500E-11	6.582E-13	1.234E-19
0U-238	U-238	5.530E-14	6.636E-16	6.490E-16	6.209E-16	5.318E-16	3.416E-16	7.259E-17	8.688E-19	1.629E-25

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-238	U-238	7.959E-16	9.551E-18	9.342E-18	8.938E-18	7.655E-18	4.918E-18	1.045E-18	1.251E-20	2.345E-27
U-238	ΣS(j):		6.731E-16	6.584E-16	6.299E-16	5.395E-16	3.466E-16	7.364E-17	8.813E-19	1.653E-25
0U-238	U-238	1.997E-07	2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
U-238	U-238	2.636E-13	3.163E-15	3.094E-15	2.960E-15	2.535E-15	1.629E-15	3.460E-16	4.141E-18	7.766E-25
U-238	ΣS(j):		2.396E-09	2.344E-09	2.242E-09	1.921E-09	1.234E-09	2.621E-10	3.137E-12	5.884E-19
0U-238	U-238	3.794E-15	4.553E-17	4.453E-17	4.260E-17	3.649E-17	2.344E-17	4.981E-18	5.961E-20	1.118E-26

THF(i) is the thread fraction of the parent nuclide.
0RESCALC.EXE execution time = 122.51 seconds

DCFPAK 3.02 (Infant) – Risk

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1RESRAD, Version 7.0      T½ Limit = 180 days        03/25/2015  13:02  Page   1
 Intrisk : NC Suburban Resident
 File    : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

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    Part III: Intake Quantities and Health Risk Factors
    ===================================================

 Cancer Risk Slope Factors ..............................    2
 Risk Slope and ETFG for the Ground Pathway ..............    5
 Amount of Intake Quantities and Excess Cancer Risks
      Time= 0.000E+00 ...................................    6
      Time= 1.000E+00 ...................................   10
      Time= 3.000E+00 ...................................   14
      Time= 1.000E+01 ...................................   18
      Time= 3.000E+01 ...................................   22
      Time= 1.000E+02 ...................................   26
      Time= 3.000E+02 ...................................   30
      Time= 1.000E+03 ...................................   34
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1RESRAD, Version 7.0 T½ Limit = 180 days 03/25/2015 13:02 Page 2
Intrisk : NC Suburban Resident
File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Cancer Risk Slope Factors Summary Table
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.63E-06	1.98E-10	SLPF(1,1)
Sf-1	Ac-227+D1	1.65E-06	1.98E-10	SLPF(2,1)
Sf-1	Ac-227+D2	1.32E-06	1.98E-10	SLPF(3,1)
Sf-1	Ac-227+D3	1.34E-06	1.98E-10	SLPF(4,1)
Sf-1	Ac-227+D4	1.72E-06	1.98E-10	SLPF(5,1)
Sf-1	Ac-227+D5	1.74E-06	1.98E-10	SLPF(6,1)
Sf-1	Pa-231	1.27E-07	1.27E-07	SLPF(7,1)
Sf-1	Pb-210+D	4.30E-09	1.48E-09	SLPF(13,1)
Sf-1	Pb-210+D1	4.30E-09	1.48E-09	SLPF(14,1)
Sf-1	Pb-210+D2	1.04E-08	1.48E-09	SLPF(15,1)
Sf-1	Pb-210+D3	4.91E-07	1.48E-09	SLPF(16,1)
Sf-1	Ra-226+D	8.36E-06	2.50E-08	SLPF(17,1)
Sf-1	Ra-226+D1	2.18E-05	2.50E-08	SLPF(20,1)
Sf-1	Ra-226+D2	7.37E-06	2.50E-08	SLPF(23,1)
Sf-1	Ra-226+D3	2.08E-05	2.50E-08	SLPF(26,1)
Sf-1	Ra-226+D4	3.05E-08	2.50E-08	SLPF(29,1)
Sf-1	Ra-228+D	4.04E-06	3.43E-11	SLPF(32,1)
Sf-1	Th-228+D	7.33E-06	5.64E-09	SLPF(33,1)
Sf-1	Th-230	8.45E-10	8.45E-10	SLPF(34,1)
Sf-1	Th-232	3.58E-10	3.58E-10	SLPF(49,1)
Sf-1	U-234	2.53E-10	2.53E-10	SLPF(50,1)
Sf-1	U-235+D	5.76E-07	5.51E-07	SLPF(65,1)
Sf-1	U-238	1.24E-10	1.24E-10	SLPF(71,1)
Sf-1	U-238+D	6.73E-06	1.24E-10	SLPF(72,1)
Sf-1	U-238+D1	1.08E-07	1.24E-10	SLPF(87,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.14E-07	1.49E-07	SLPF(1,2)
Sf-2	Ac-227+D1	2.14E-07	1.49E-07	SLPF(2,2)
Sf-2	Ac-227+D2	1.79E-07	1.49E-07	SLPF(3,2)
Sf-2	Ac-227+D3	1.79E-07	1.49E-07	SLPF(4,2)
Sf-2	Ac-227+D4	1.50E-07	1.49E-07	SLPF(5,2)
Sf-2	Ac-227+D5	1.50E-07	1.49E-07	SLPF(6,2)
Sf-2	Pa-231	7.62E-08	7.62E-08	SLPF(7,2)
Sf-2	Pb-210+D	3.08E-08	1.59E-08	SLPF(13,2)
Sf-2	Pb-210+D1	3.08E-08	1.59E-08	SLPF(14,2)
Sf-2	Pb-210+D2	1.63E-08	1.59E-08	SLPF(15,2)
Sf-2	Pb-210+D3	1.59E-08	1.59E-08	SLPF(16,2)
Sf-2	Ra-226+D	2.82E-08	2.81E-08	SLPF(17,2)
Sf-2	Ra-226+D1	2.82E-08	2.81E-08	SLPF(20,2)
Sf-2	Ra-226+D2	2.82E-08	2.81E-08	SLPF(23,2)
Sf-2	Ra-226+D3	2.82E-08	2.81E-08	SLPF(26,2)
Sf-2	Ra-226+D4	2.81E-08	2.81E-08	SLPF(29,2)
Sf-2	Ra-228+D	4.37E-08	4.37E-08	SLPF(32,2)
Sf-2	Th-228+D	1.44E-07	1.32E-07	SLPF(33,2)
Sf-2	Th-230	3.41E-08	3.41E-08	SLPF(34,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(49,2)
Sf-2	U-234	2.78E-08	2.78E-08	SLPF(50,2)
Sf-2	U-235+D	2.50E-08	2.50E-08	SLPF(65,2)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-2	U-238	2.36E-08	2.36E-08	SLPF(71,2)
Sf-2	U-238+D	2.37E-08	2.36E-08	SLPF(72,2)
Sf-2	U-238+D1	2.37E-08	2.36E-08	SLPF(87,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.55E-10	2.45E-10	SLPF(1,3)
Sf-3	Ac-227+D1	6.55E-10	2.45E-10	SLPF(2,3)
Sf-3	Ac-227+D2	5.94E-10	2.45E-10	SLPF(3,3)
Sf-3	Ac-227+D3	5.94E-10	2.45E-10	SLPF(4,3)
Sf-3	Ac-227+D4	2.56E-10	2.45E-10	SLPF(5,3)
Sf-3	Ac-227+D5	2.56E-10	2.45E-10	SLPF(6,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(7,3)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(13,3)
Sf-3	Pb-210+D1	3.44E-09	1.18E-09	SLPF(14,3)
Sf-3	Pb-210+D2	1.19E-09	1.18E-09	SLPF(15,3)
Sf-3	Pb-210+D3	1.18E-09	1.18E-09	SLPF(16,3)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(17,3)
Sf-3	Ra-226+D1	5.15E-10	5.14E-10	SLPF(20,3)
Sf-3	Ra-226+D2	5.14E-10	5.14E-10	SLPF(23,3)
Sf-3	Ra-226+D3	5.14E-10	5.14E-10	SLPF(26,3)
Sf-3	Ra-226+D4	5.14E-10	5.14E-10	SLPF(29,3)
Sf-3	Ra-228+D	1.43E-09	1.42E-09	SLPF(32,3)
Sf-3	Th-228+D	4.23E-10	1.48E-10	SLPF(33,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(34,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(49,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(50,3)
Sf-3	U-235+D	9.76E-11	9.43E-11	SLPF(65,3)
Sf-3	U-238	8.66E-11	8.66E-11	SLPF(71,3)
Sf-3	U-238+D	1.24E-10	8.66E-11	SLPF(72,3)
Sf-3	U-238+D1	1.20E-10	8.66E-11	SLPF(87,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.88E-10	2.01E-10	SLPF(1,4)
Sf-3	Ac-227+D1	4.88E-10	2.01E-10	SLPF(2,4)
Sf-3	Ac-227+D2	4.47E-10	2.01E-10	SLPF(3,4)
Sf-3	Ac-227+D3	4.47E-10	2.01E-10	SLPF(4,4)
Sf-3	Ac-227+D4	2.09E-10	2.01E-10	SLPF(5,4)
Sf-3	Ac-227+D5	2.09E-10	2.01E-10	SLPF(6,4)
Sf-3	Pa-231	1.72E-10	1.72E-10	SLPF(7,4)
Sf-3	Pb-210+D	2.67E-09	8.84E-10	SLPF(13,4)
Sf-3	Pb-210+D1	2.67E-09	8.84E-10	SLPF(14,4)
Sf-3	Pb-210+D2	8.93E-10	8.84E-10	SLPF(15,4)
Sf-3	Pb-210+D3	8.84E-10	8.84E-10	SLPF(16,4)
Sf-3	Ra-226+D	3.85E-10	3.85E-10	SLPF(17,4)
Sf-3	Ra-226+D1	3.85E-10	3.85E-10	SLPF(20,4)
Sf-3	Ra-226+D2	3.85E-10	3.85E-10	SLPF(23,4)
Sf-3	Ra-226+D3	3.85E-10	3.85E-10	SLPF(26,4)
Sf-3	Ra-226+D4	3.85E-10	3.85E-10	SLPF(29,4)
Sf-3	Ra-228+D	1.04E-09	1.04E-09	SLPF(32,4)
Sf-3	Th-228+D	3.00E-10	1.08E-10	SLPF(33,4)

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Cancer Risk Slope Factors Summary Table (continued)
Risk Library: DCFPAK3.02 Morbidity

0 Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-3	Th-230	9.14E-11	9.14E-11	SLPF(34,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(49,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(50,4)
Sf-3	U-235+D	7.17E-11	6.95E-11	SLPF(65,4)
Sf-3	U-238	6.40E-11	6.40E-11	SLPF(71,4)
Sf-3	U-238+D	8.92E-11	6.40E-11	SLPF(72,4)
Sf-3	U-238+D1	8.71E-11	6.40E-11	SLPF(87,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.55E-10	2.45E-10	SLPF(1,5)
Sf-3	Ac-227+D1	6.55E-10	2.45E-10	SLPF(2,5)
Sf-3	Ac-227+D2	5.94E-10	2.45E-10	SLPF(3,5)
Sf-3	Ac-227+D3	5.94E-10	2.45E-10	SLPF(4,5)
Sf-3	Ac-227+D4	2.56E-10	2.45E-10	SLPF(5,5)
Sf-3	Ac-227+D5	2.56E-10	2.45E-10	SLPF(6,5)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(7,5)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(13,5)
Sf-3	Pb-210+D1	3.44E-09	1.18E-09	SLPF(14,5)
Sf-3	Pb-210+D2	1.19E-09	1.18E-09	SLPF(15,5)
Sf-3	Pb-210+D3	1.18E-09	1.18E-09	SLPF(16,5)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(17,5)
Sf-3	Ra-226+D1	5.15E-10	5.14E-10	SLPF(20,5)
Sf-3	Ra-226+D2	5.14E-10	5.14E-10	SLPF(23,5)
Sf-3	Ra-226+D3	5.14E-10	5.14E-10	SLPF(26,5)
Sf-3	Ra-226+D4	5.14E-10	5.14E-10	SLPF(29,5)
Sf-3	Ra-228+D	1.43E-09	1.42E-09	SLPF(32,5)
Sf-3	Th-228+D	4.23E-10	1.48E-10	SLPF(33,5)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(34,5)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(49,5)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(50,5)
Sf-3	U-235+D	9.76E-11	9.43E-11	SLPF(65,5)
Sf-3	U-238	8.66E-11	8.66E-11	SLPF(71,5)
Sf-3	U-238+D	1.24E-10	8.66E-11	SLPF(72,5)
Sf-3	U-238+D1	1.20E-10	8.66E-11	SLPF(87,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	3.88E+02	3.88E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	3.88E+02	3.88E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.88E+02	1.88E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	1.88E+02	1.88E+02	KFACTR(2,2)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Risk Slope and Environmental Transport Factors for the Ground Pathway

0Nuclide (i)	Slope(i)* t=	ETFG(i,t) At Time in Years (dimensionless) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.990E-10	3.328E-01	3.328E-01	3.328E-01	3.328E-01	3.328E-01	3.329E-01	3.330E-01	3.331E-01
Ac-228	4.040E-06	3.183E-01	3.183E-01	3.183E-01	3.183E-01	3.182E-01	3.179E-01	3.169E-01	3.115E-01
At-218	2.740E-11	3.272E-01	3.272E-01	3.272E-01	3.272E-01	3.272E-01	3.273E-01	3.273E-01	3.269E-01
At-219	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Bi-210	2.770E-09	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.290E-01	3.291E-01	3.293E-01	3.298E-01
Bi-211	1.900E-07	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.268E-01	3.266E-01	3.247E-01
Bi-212	4.960E-07	3.189E-01	3.189E-01	3.189E-01	3.189E-01	3.188E-01	3.185E-01	3.175E-01	3.120E-01
Bi-214	7.340E-06	3.153E-01	3.153E-01	3.153E-01	3.152E-01	3.151E-01	3.147E-01	3.132E-01	3.062E-01
Bi-215	1.080E-06	3.242E-01	3.242E-01	3.241E-01	3.241E-01	3.241E-01	3.239E-01	3.233E-01	3.197E-01
Fr-223	1.350E-07	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.286E-01	3.285E-01	3.274E-01
Hg-206	4.830E-07	3.278E-01	3.278E-01	3.278E-01	3.278E-01	3.277E-01	3.277E-01	3.275E-01	3.257E-01
Pa-231	1.270E-07	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.283E-01	3.282E-01	3.269E-01
Pa-234	6.620E-06	3.204E-01	3.204E-01	3.203E-01	3.203E-01	3.203E-01	3.200E-01	3.192E-01	3.145E-01
Pa-234m	9.060E-08	3.210E-01	3.210E-01	3.210E-01	3.210E-01	3.209E-01	3.207E-01	3.199E-01	3.156E-01
Pb-210	1.480E-09	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Pb-211	2.910E-07	3.224E-01	3.224E-01	3.224E-01	3.224E-01	3.223E-01	3.222E-01	3.216E-01	3.179E-01
Pb-212	4.960E-07	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.291E-01	3.284E-01
Pb-214	9.940E-07	3.277E-01	3.277E-01	3.277E-01	3.277E-01	3.277E-01	3.276E-01	3.274E-01	3.255E-01
Po-210	4.510E-11	3.205E-01	3.205E-01	3.205E-01	3.205E-01	3.204E-01	3.201E-01	3.193E-01	3.144E-01
Po-211	3.760E-08	3.202E-01	3.202E-01	3.202E-01	3.202E-01	3.201E-01	3.199E-01	3.191E-01	3.145E-01
Po-212	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-214	3.850E-10	3.206E-01	3.206E-01	3.206E-01	3.206E-01	3.205E-01	3.203E-01	3.196E-01	3.151E-01
Po-215	7.480E-10	3.253E-01	3.253E-01	3.253E-01	3.252E-01	3.252E-01	3.251E-01	3.248E-01	3.224E-01
Po-216	7.100E-11	3.207E-01	3.207E-01	3.207E-01	3.207E-01	3.206E-01	3.204E-01	3.196E-01	3.148E-01
Po-218	6.840E-15	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01
Ra-223	4.550E-07	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.290E-01	3.283E-01
Ra-224	3.910E-08	3.288E-01	3.288E-01	3.288E-01	3.288E-01	3.289E-01	3.289E-01	3.289E-01	3.281E-01
Ra-226	2.500E-08	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.295E-01	3.295E-01	3.293E-01
Ra-228	3.430E-11	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01
Rn-218	3.390E-09	3.223E-01	3.223E-01	3.223E-01	3.223E-01	3.222E-01	3.221E-01	3.215E-01	3.180E-01
Rn-219	2.350E-07	3.279E-01	3.279E-01	3.279E-01	3.279E-01	3.279E-01	3.278E-01	3.276E-01	3.259E-01
Rn-220	2.770E-09	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.233E-01	3.228E-01	3.197E-01
Rn-222	1.690E-09	3.244E-01	3.244E-01	3.244E-01	3.244E-01	3.243E-01	3.243E-01	3.239E-01	3.214E-01
Th-227	4.450E-07	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.289E-01	3.288E-01	3.279E-01
Th-228	5.640E-09	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.306E-01	3.307E-01
Th-230	8.450E-10	3.309E-01	3.309E-01	3.309E-01	3.309E-01	3.310E-01	3.310E-01	3.311E-01	3.311E-01
Th-231	2.490E-08	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.418E-01	3.417E-01
Th-232	3.580E-10	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.419E-01	3.418E-01
Th-234	1.780E-08	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01	3.301E-01
Tl-206	6.110E-09	3.275E-01	3.275E-01	3.275E-01	3.275E-01	3.276E-01	3.277E-01	3.280E-01	3.286E-01
Tl-207	1.590E-08	3.234E-01	3.234E-01	3.234E-01	3.234E-01	3.233E-01	3.232E-01	3.228E-01	3.202E-01
Tl-208	1.750E-05	3.089E-01	3.089E-01	3.089E-01	3.088E-01	3.086E-01	3.080E-01	3.061E-01	2.972E-01
Tl-210	1.340E-05	3.163E-01	3.163E-01	3.163E-01	3.162E-01	3.161E-01	3.157E-01	3.144E-01	3.079E-01
U-234	2.530E-10	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.415E-01	3.414E-01
U-235	5.510E-07	3.294E-01	3.294E-01	3.294E-01	3.294E-01	3.295E-01	3.295E-01	3.296E-01	3.294E-01
U-238	1.240E-10	3.321E-01	3.321E-01	3.321E-01	3.321E-01	3.320E-01	3.319E-01	3.316E-01	3.296E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.959E-04	0.000E+00	0.000E+00	0.000E+00	1.127E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.127E-01
Pa-231	3.919E-04	0.000E+00	0.000E+00	0.000E+00	2.253E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E-01
Pb-210	2.239E-04	0.000E+00	0.000E+00	0.000E+00	1.288E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.288E-01
Ra-226	1.959E-04	0.000E+00	0.000E+00	0.000E+00	1.127E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.127E-01
Ra-228	1.008E-05	0.000E+00	0.000E+00	0.000E+00	5.794E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.794E-03
Th-228	2.799E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	1.609E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
U-234	3.359E-04	0.000E+00	0.000E+00	0.000E+00	1.931E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.931E-01
U-235	1.456E-05	0.000E+00	0.000E+00	0.000E+00	8.369E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.369E-03
U-238	3.359E-04	0.000E+00	0.000E+00	0.000E+00	1.931E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.931E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.115E-08	0.0683	9.087E-10	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.602E-09	0.0013
Pa-231	1.279E-08	0.0108	6.546E-10	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.115E-09	0.0009
Pb-210	3.333E-10	0.0003	2.009E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.290E-08	0.0109
Ra-226	8.819E-07	0.7427	2.630E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.759E-09	0.0023
Ra-228	2.923E-08	0.0246	2.782E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.221E-10	0.0004
Th-228	5.263E-08	0.0443	9.338E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.572E-10	0.0001
Th-230	8.386E-09	0.0071	2.860E-08	0.0241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.748E-08	0.0484
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.429E-11	0.0001
U-234	2.273E-11	0.0000	2.049E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.042E-10	0.0003
U-235	2.166E-09	0.0018	7.982E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.790E-11	0.0000
U-238	1.010E-08	0.0085	1.743E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.102E-10	0.0004
Total	1.079E-06	0.9085	3.117E-08	0.0263	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.753E-08	0.0653

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.366E-08	0.0705
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-08	0.0123
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.343E-08	0.0113
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.849E-07	0.7452
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.978E-08	0.0251
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.288E-08	0.0445
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.447E-08	0.0796
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.318E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.192E-09	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E-08	0.0091
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.187E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.981E-08	0.0335	4.458E-10	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.858E-10	0.0007
Pa-231	5.413E-08	0.0456	1.118E-09	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.931E-09	0.0016
Pb-210	1.946E-10	0.0002	1.173E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.531E-09	0.0063
Ra-226	4.403E-07	0.3708	1.801E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.514E-09	0.0038
Ra-228	9.193E-09	0.0077	1.356E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.709E-11	0.0001
Th-228	6.286E-09	0.0053	1.115E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.877E-11	0.0000
Th-230	4.501E-07	0.3790	2.877E-08	0.0242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.109E-08	0.0515
Th-232	6.639E-08	0.0559	1.328E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.477E-10	0.0005
U-234	2.317E-11	0.0000	2.049E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.042E-10	0.0003
U-235	2.167E-09	0.0018	7.993E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.792E-11	0.0000
U-238	1.010E-08	0.0085	1.743E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.103E-10	0.0004
Total	1.079E-06	0.9085	3.117E-08	0.0263	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.753E-08	0.0653

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.104E-08	0.0346
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.718E-08	0.0482
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.843E-09	0.0066
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.450E-07	0.3748
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.284E-09	0.0078
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.316E-09	0.0053
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.399E-07	0.4547
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.717E-08	0.0566
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.323E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.193E-09	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E-08	0.0091
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.187E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.915E-04	0.000E+00	0.000E+00	0.000E+00	1.101E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.101E-01
Pa-231	3.833E-04	0.000E+00	0.000E+00	0.000E+00	2.204E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.204E-01
Pb-210	2.208E-04	0.000E+00	0.000E+00	0.000E+00	1.269E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.269E-01
Ra-226	2.048E-04	0.000E+00	0.000E+00	0.000E+00	1.178E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.178E-01
Ra-228	1.195E-05	0.000E+00	0.000E+00	0.000E+00	6.869E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.869E-03
Th-228	2.285E-05	0.000E+00	0.000E+00	0.000E+00	1.314E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.314E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	1.609E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
U-234	3.286E-04	0.000E+00	0.000E+00	0.000E+00	1.889E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.889E-01
U-235	1.424E-05	0.000E+00	0.000E+00	0.000E+00	8.186E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.186E-03
U-238	3.286E-04	0.000E+00	0.000E+00	0.000E+00	1.889E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.889E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.933E-08	0.0658	8.884E-10	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E-09	0.0013
Pa-231	1.251E-08	0.0104	6.403E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-09	0.0009
Pb-210	3.342E-10	0.0003	2.014E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-08	0.0107
Ra-226	9.018E-07	0.7481	2.689E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.821E-09	0.0023
Ra-228	2.985E-08	0.0248	2.841E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.331E-10	0.0004
Th-228	5.256E-08	0.0436	9.326E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.570E-10	0.0001
Th-230	8.386E-09	0.0070	2.860E-08	0.0237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.748E-08	0.0477
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.429E-11	0.0001
U-234	2.224E-11	0.0000	2.004E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.953E-10	0.0003
U-235	2.119E-09	0.0018	7.807E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-11	0.0000
U-238	9.878E-09	0.0082	1.705E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.991E-10	0.0004
Total	1.097E-06	0.9098	3.113E-08	0.0258	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.756E-08	0.0643

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.179E-08	0.0678
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-08	0.0118
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-08	0.0112
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.048E-07	0.7506
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.041E-08	0.0252
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.281E-08	0.0438
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.446E-08	0.0784
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.179E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-09	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.055E-08	0.0088
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.650E-08	0.0303	4.087E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.205E-10	0.0006
Pa-231	5.535E-08	0.0459	1.120E-09	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.936E-09	0.0016
Pb-210	1.866E-10	0.0002	1.124E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.219E-09	0.0060
Ra-226	4.332E-07	0.3594	1.803E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.641E-09	0.0038
Ra-228	8.662E-09	0.0072	1.297E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.918E-11	0.0001
Th-228	4.374E-09	0.0036	7.759E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E-11	0.0000
Th-230	4.771E-07	0.3958	2.878E-08	0.0239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.137E-08	0.0509
Th-232	6.938E-08	0.0576	1.373E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.722E-10	0.0006
U-234	2.272E-11	0.0000	2.004E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.954E-10	0.0003
U-235	2.120E-09	0.0018	7.818E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.753E-11	0.0000
U-238	9.878E-09	0.0082	1.705E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.991E-10	0.0004
Total	1.097E-06	0.9098	3.113E-08	0.0258	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.756E-08	0.0643

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.763E-08	0.0312
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.840E-08	0.0485
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.518E-09	0.0062
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.380E-07	0.3634
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.744E-09	0.0073
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.395E-09	0.0036
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E-07	0.4705
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.019E-08	0.0582
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.185E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.145E-09	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.055E-08	0.0088
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.829E-04	0.000E+00	0.000E+00	0.000E+00	1.051E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.051E-01
Pa-231	3.667E-04	0.000E+00	0.000E+00	0.000E+00	2.108E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.108E-01
Pb-210	2.157E-04	0.000E+00	0.000E+00	0.000E+00	1.240E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.240E-01
Ra-226	2.221E-04	0.000E+00	0.000E+00	0.000E+00	1.277E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.277E-01
Ra-228	1.500E-05	0.000E+00	0.000E+00	0.000E+00	8.625E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.625E-03
Th-228	1.814E-05	0.000E+00	0.000E+00	0.000E+00	1.043E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.043E-02
Th-230	2.799E-02	0.000E+00	0.000E+00	0.000E+00	1.609E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
U-234	3.143E-04	0.000E+00	0.000E+00	0.000E+00	1.807E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.807E-01
U-235	1.362E-05	0.000E+00	0.000E+00	0.000E+00	7.832E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.832E-03
U-238	3.143E-04	0.000E+00	0.000E+00	0.000E+00	1.807E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.807E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.583E-08	0.0611	8.492E-10	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.497E-09	0.0012
Pa-231	1.197E-08	0.0096	6.125E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-09	0.0008
Pb-210	3.369E-10	0.0003	2.031E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.304E-08	0.0105
Ra-226	9.406E-07	0.7576	2.805E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.943E-09	0.0024
Ra-228	3.086E-08	0.0249	2.937E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.512E-10	0.0004
Th-228	5.327E-08	0.0429	9.453E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.592E-10	0.0001
Th-230	8.385E-09	0.0068	2.860E-08	0.0230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.748E-08	0.0463
Th-232	3.671E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.429E-11	0.0001
U-234	2.127E-11	0.0000	1.917E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.782E-10	0.0003
U-235	2.027E-09	0.0016	7.469E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.675E-11	0.0000
U-238	9.450E-09	0.0076	1.631E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.775E-10	0.0004
Total	1.133E-06	0.9124	3.106E-08	0.0250	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.764E-08	0.0625

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.818E-08	0.0630
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.363E-08	0.0110
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.358E-08	0.0109
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.438E-07	0.7602
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.144E-08	0.0253
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.353E-08	0.0431
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.446E-08	0.0761
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.912E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.052E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.009E-08	0.0081
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.241E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.068E-08	0.0247	3.436E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.057E-10	0.0005
Pa-231	5.712E-08	0.0460	1.118E-09	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.934E-09	0.0016
Pb-210	1.714E-10	0.0001	1.033E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.633E-09	0.0053
Ra-226	4.194E-07	0.3378	1.804E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.864E-09	0.0039
Ra-228	7.293E-09	0.0059	1.111E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.475E-11	0.0000
Th-228	2.118E-09	0.0017	3.757E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.325E-12	0.0000
Th-230	5.298E-07	0.4267	2.880E-08	0.0232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.196E-08	0.0499
Th-232	7.473E-08	0.0602	1.454E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-10	0.0006
U-234	2.184E-11	0.0000	1.918E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.783E-10	0.0003
U-235	2.028E-09	0.0016	7.482E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.677E-11	0.0000
U-238	9.450E-09	0.0076	1.631E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.775E-10	0.0004
Total	1.133E-06	0.9124	3.106E-08	0.0250	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.764E-08	0.0625

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-08	0.0255
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.017E-08	0.0485
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.908E-09	0.0056
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.244E-07	0.3419
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.359E-09	0.0059
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E-09	0.0017
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.205E-07	0.4998
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.559E-08	0.0609
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.919E-10	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.052E-09	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.009E-08	0.0081
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.241E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.559E-04	0.000E+00	0.000E+00	0.000E+00	8.962E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.962E-02
Pa-231	3.140E-04	0.000E+00	0.000E+00	0.000E+00	1.806E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.806E-01
Pb-210	2.081E-04	0.000E+00	0.000E+00	0.000E+00	1.196E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.196E-01
Ra-226	2.785E-04	0.000E+00	0.000E+00	0.000E+00	1.601E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.601E-01
Ra-228	2.099E-05	0.000E+00	0.000E+00	0.000E+00	1.207E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.207E-02
Th-228	1.944E-05	0.000E+00	0.000E+00	0.000E+00	1.118E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.118E-02
Th-230	2.798E-02	0.000E+00	0.000E+00	0.000E+00	1.609E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E+01
Th-232	2.799E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
U-234	2.692E-04	0.000E+00	0.000E+00	0.000E+00	1.548E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.548E-01
U-235	1.167E-05	0.000E+00	0.000E+00	0.000E+00	6.708E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.708E-03
U-238	2.692E-04	0.000E+00	0.000E+00	0.000E+00	1.548E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.548E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.479E-08	0.0477	7.256E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-09	0.0009
Pa-231	1.025E-08	0.0075	5.246E-10	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.932E-10	0.0007
Pb-210	3.536E-10	0.0003	2.131E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-08	0.0101
Ra-226	1.067E-06	0.7848	3.182E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.339E-09	0.0025
Ra-228	3.284E-08	0.0242	3.125E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.865E-10	0.0004
Th-228	5.703E-08	0.0419	1.012E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.704E-10	0.0001
Th-230	8.384E-09	0.0062	2.859E-08	0.0210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.747E-08	0.0423
Th-232	3.670E-12	0.0000	3.634E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.428E-11	0.0000
U-234	1.822E-11	0.0000	1.642E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.239E-10	0.0002
U-235	1.736E-09	0.0013	6.397E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-11	0.0000
U-238	8.094E-09	0.0060	1.397E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.090E-10	0.0003
Total	1.250E-06	0.9198	3.085E-08	0.0227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.823E-08	0.0575

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.680E-08	0.0491
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.167E-08	0.0086
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.425E-08	0.0105
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.071E-06	0.7875
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.346E-08	0.0246
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.730E-08	0.0421
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.444E-08	0.0695
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.064E-10	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.757E-09	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.643E-09	0.0064
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.360E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.671E-08	0.0123	1.871E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.299E-10	0.0002
Pa-231	5.834E-08	0.0429	1.063E-09	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-09	0.0014
Pb-210	1.275E-10	0.0001	7.683E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.933E-09	0.0036
Ra-226	3.742E-07	0.2753	1.771E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.376E-09	0.0040
Ra-228	3.181E-09	0.0023	4.942E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.219E-11	0.0000
Th-228	1.673E-10	0.0001	2.968E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.997E-13	0.0000
Th-230	7.013E-07	0.5158	2.887E-08	0.0212	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.418E-08	0.0472
Th-232	8.653E-08	0.0636	1.636E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.985E-10	0.0006
U-234	1.915E-11	0.0000	1.643E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.240E-10	0.0002
U-235	1.737E-09	0.0013	6.414E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-11	0.0000
U-238	8.094E-09	0.0060	1.397E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.090E-10	0.0003
Total	1.250E-06	0.9198	3.085E-08	0.0227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.823E-08	0.0575

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.723E-08	0.0127
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.124E-08	0.0450
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.137E-09	0.0038
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.798E-07	0.2794
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.208E-09	0.0024
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-10	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.943E-07	0.5843
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.749E-08	0.0644
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.074E-10	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.758E-09	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.643E-09	0.0064
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.360E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	9.951E-05	0.000E+00	0.000E+00	0.000E+00	5.722E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.722E-02
Pa-231	2.017E-04	0.000E+00	0.000E+00	0.000E+00	1.159E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.159E-01
Pb-210	2.392E-04	0.000E+00	0.000E+00	0.000E+00	1.375E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.375E-01
Ra-226	4.081E-04	0.000E+00	0.000E+00	0.000E+00	2.346E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.346E-01
Ra-228	2.449E-05	0.000E+00	0.000E+00	0.000E+00	1.408E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.408E-02
Th-228	2.434E-05	0.000E+00	0.000E+00	0.000E+00	1.400E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.400E-02
Th-230	2.797E-02	0.000E+00	0.000E+00	0.000E+00	1.608E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.608E+01
Th-232	2.798E-05	0.000E+00	0.000E+00	0.000E+00	1.609E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.609E-02
U-234	1.730E-04	0.000E+00	0.000E+00	0.000E+00	9.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.944E-02
U-235	7.495E-06	0.000E+00	0.000E+00	0.000E+00	4.309E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.309E-03
U-238	1.730E-04	0.000E+00	0.000E+00	0.000E+00	9.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.944E-02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.149E-08	0.0255	4.646E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.190E-10	0.0005
Pa-231	6.583E-09	0.0040	3.368E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.735E-10	0.0004
Pb-210	4.343E-10	0.0003	2.617E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-08	0.0103
Ra-226	1.357E-06	0.8346	4.050E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.249E-09	0.0026
Ra-228	3.398E-08	0.0209	3.235E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.071E-10	0.0004
Th-228	6.012E-08	0.0370	1.067E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.797E-10	0.0001
Th-230	8.379E-09	0.0052	2.858E-08	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.743E-08	0.0353
Th-232	3.669E-12	0.0000	3.632E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.426E-11	0.0000
U-234	1.170E-11	0.0000	1.055E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.081E-10	0.0001
U-235	1.116E-09	0.0007	4.110E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.216E-12	0.0000
U-238	5.199E-09	0.0032	8.975E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-10	0.0002
Total	1.515E-06	0.9314	3.042E-08	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.121E-08	0.0499

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.277E-08	0.0263
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.494E-09	0.0046
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.750E-08	0.0108
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.362E-06	0.8375
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.462E-08	0.0213
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.040E-08	0.0371
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.439E-08	0.0580
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-10	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E-10	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-09	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.551E-09	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.626E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.944E-09	0.0018	3.297E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.813E-11	0.0000
Pa-231	4.513E-08	0.0277	7.684E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-09	0.0008
Pb-210	5.470E-11	0.0000	3.296E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.116E-09	0.0013
Ra-226	2.703E-07	0.1662	1.516E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.401E-09	0.0033
Ra-228	2.141E-10	0.0001	3.342E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.470E-12	0.0000
Th-228	1.185E-13	0.0000	2.103E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-16	0.0000
Th-230	1.096E-06	0.6738	2.906E-08	0.0179	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.097E-08	0.0436
Th-232	9.389E-08	0.0577	1.751E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.496E-10	0.0005
U-234	1.395E-11	0.0000	1.056E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.083E-10	0.0001
U-235	1.117E-09	0.0007	4.132E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.254E-12	0.0000
U-238	5.199E-09	0.0032	8.977E-11	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-10	0.0002
Total	1.515E-06	0.9314	3.042E-08	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.121E-08	0.0499

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.035E-09	0.0019
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.723E-08	0.0290
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.204E-09	0.0014
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.758E-07	0.1696
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.160E-10	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.190E-13	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.196E-06	0.7353
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.491E-08	0.0584
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.278E-10	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.130E-09	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.551E-09	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.626E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.107E-05	0.000E+00	0.000E+00	0.000E+00	1.211E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.211E-02
Pa-231	4.279E-05	0.000E+00	0.000E+00	0.000E+00	2.460E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.460E-02
Pb-210	4.251E-04	0.000E+00	0.000E+00	0.000E+00	2.444E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.444E-01
Ra-226	6.367E-04	0.000E+00	0.000E+00	0.000E+00	3.660E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.660E-01
Ra-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	1.420E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.420E-02
Th-228	2.470E-05	0.000E+00	0.000E+00	0.000E+00	1.420E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.420E-02
Th-230	2.792E-02	0.000E+00	0.000E+00	0.000E+00	1.605E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.605E+01
Th-232	2.794E-05	0.000E+00	0.000E+00	0.000E+00	1.606E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.606E-02
U-234	3.675E-05	0.000E+00	0.000E+00	0.000E+00	2.113E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.113E-02
U-235	1.592E-06	0.000E+00	0.000E+00	0.000E+00	9.156E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.156E-04
U-238	3.675E-05	0.000E+00	0.000E+00	0.000E+00	2.113E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.113E-02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.792E-09	0.0042	9.847E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.736E-10	0.0001
Pa-231	1.397E-09	0.0007	7.147E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.217E-10	0.0001
Pb-210	6.904E-10	0.0003	4.160E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.671E-08	0.0127
Ra-226	1.867E-06	0.8879	5.579E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.853E-09	0.0028
Ra-228	3.398E-08	0.0162	3.238E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.077E-10	0.0003
Th-228	6.016E-08	0.0286	1.070E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-10	0.0001
Th-230	8.364E-09	0.0040	2.852E-08	0.0136	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.732E-08	0.0273
Th-232	3.664E-12	0.0000	3.628E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.418E-11	0.0000
U-234	2.487E-12	0.0000	2.241E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.421E-11	0.0000
U-235	2.371E-10	0.0001	8.732E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.958E-12	0.0000
U-238	1.104E-09	0.0005	1.907E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.582E-11	0.0000
Total	1.982E-06	0.9425	2.988E-08	0.0142	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.113E-08	0.0433

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.064E-09	0.0043
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.590E-09	0.0008
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.781E-08	0.0132
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.874E-06	0.8910
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.462E-08	0.0165
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.045E-08	0.0287
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.421E-08	0.0448
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-10	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.911E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.399E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-09	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.761E-12	0.0000	7.573E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-13	0.0000
Pa-231	1.018E-08	0.0048	1.698E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.951E-10	0.0001
Pb-210	2.830E-12	0.0000	1.705E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-10	0.0001
Ra-226	8.652E-08	0.0411	5.786E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.327E-09	0.0011
Ra-228	1.529E-14	0.0000	2.390E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E-16	0.0000
Th-228	1.119E-24	0.0000	1.988E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.348E-27	0.0000
Th-230	1.790E-06	0.8511	2.943E-08	0.0140	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.745E-08	0.0416
Th-232	9.415E-08	0.0448	1.757E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.521E-10	0.0004
U-234	9.204E-12	0.0000	2.254E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.457E-11	0.0000
U-235	2.379E-10	0.0001	8.872E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.982E-12	0.0000
U-238	1.104E-09	0.0005	1.908E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.583E-11	0.0000
Total	1.982E-06	0.9425	2.988E-08	0.0142	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.113E-08	0.0433

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.971E-12	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E-08	0.0051
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-10	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.890E-08	0.0423
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.542E-14	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.125E-24	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.907E-06	0.9066
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.518E-08	0.0453
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.631E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-10	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-09	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.511E-07	0.000E+00	0.000E+00	0.000E+00	1.444E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.444E-04
Pa-231	5.100E-07	0.000E+00	0.000E+00	0.000E+00	2.932E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.932E-04
Pb-210	5.421E-04	0.000E+00	0.000E+00	0.000E+00	3.117E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.117E-01
Ra-226	7.368E-04	0.000E+00	0.000E+00	0.000E+00	4.236E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.236E-01
Ra-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	1.415E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.415E-02
Th-228	2.461E-05	0.000E+00	0.000E+00	0.000E+00	1.415E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.415E-02
Th-230	2.776E-02	0.000E+00	0.000E+00	0.000E+00	1.596E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.596E+01
Th-232	2.784E-05	0.000E+00	0.000E+00	0.000E+00	1.601E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.601E-02
U-234	4.398E-07	0.000E+00	0.000E+00	0.000E+00	2.529E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.529E-04
U-235	1.906E-08	0.000E+00	0.000E+00	0.000E+00	1.096E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.096E-05
U-238	4.398E-07	0.000E+00	0.000E+00	0.000E+00	2.529E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.529E-04

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.047E-10	0.0000	1.174E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.069E-12	0.0000
Pa-231	1.664E-11	0.0000	8.519E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.450E-12	0.0000
Pb-210	8.337E-10	0.0004	5.021E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.224E-08	0.0140
Ra-226	2.081E-06	0.9009	6.243E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.549E-09	0.0028
Ra-228	3.375E-08	0.0146	3.226E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.055E-10	0.0003
Th-228	5.961E-08	0.0258	1.066E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-10	0.0001
Th-230	8.320E-09	0.0036	2.836E-08	0.0123	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.701E-08	0.0247
Th-232	3.650E-12	0.0000	3.614E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.394E-11	0.0000
U-234	2.976E-14	0.0000	2.682E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.292E-13	0.0000
U-235	2.838E-12	0.0000	1.045E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-14	0.0000
U-238	1.318E-11	0.0000	2.282E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.681E-13	0.0000
Total	2.184E-06	0.9453	2.967E-08	0.0128	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.664E-08	0.0418

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.894E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.357E-08	0.0145
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.088E-06	0.9040
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.439E-08	0.0149
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.989E-08	0.0259
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.369E-08	0.0406
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.037E-10	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.272E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.872E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.310E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.950E-19	0.0000	2.185E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.853E-21	0.0000
Pa-231	1.213E-10	0.0001	2.025E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.519E-12	0.0000
Pb-210	5.984E-16	0.0000	3.604E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.314E-14	0.0000
Ra-226	3.336E-09	0.0014	2.309E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.451E-11	0.0000
Ra-228	2.173E-26	0.0000	2.186E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.381E-28	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.087E-06	0.9034	2.949E-08	0.0128	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.570E-08	0.0414
Th-232	9.336E-08	0.0404	1.750E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.489E-10	0.0004
U-234	1.030E-11	0.0000	4.150E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.002E-12	0.0000
U-235	2.866E-12	0.0000	1.094E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-14	0.0000
U-238	1.319E-11	0.0000	2.285E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.686E-13	0.0000
Total	2.184E-06	0.9453	2.967E-08	0.0128	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.664E-08	0.0418

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Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.011E-19	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.269E-10	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.433E-09	0.0015
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.189E-26	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.212E-06	0.9576
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.438E-08	0.0409
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.172E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.902E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-11	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.310E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	4.643E-14	0.000E+00	0.000E+00	0.000E+00	2.669E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.669E-11
Pa-231	9.429E-14	0.000E+00	0.000E+00	0.000E+00	5.421E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.421E-11
Pb-210	5.367E-04	0.000E+00	0.000E+00	0.000E+00	3.086E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.086E-01
Ra-226	7.268E-04	0.000E+00	0.000E+00	0.000E+00	4.179E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.179E-01
Ra-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	1.397E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.397E-02
Th-228	2.429E-05	0.000E+00	0.000E+00	0.000E+00	1.397E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.397E-02
Th-230	2.723E-02	0.000E+00	0.000E+00	0.000E+00	1.565E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.565E+01
Th-232	2.748E-05	0.000E+00	0.000E+00	0.000E+00	1.580E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.580E-02
U-234	8.248E-14	0.000E+00	0.000E+00	0.000E+00	4.742E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.742E-11
U-235	3.574E-15	0.000E+00	0.000E+00	0.000E+00	2.055E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.055E-12
U-238	8.248E-14	0.000E+00	0.000E+00	0.000E+00	4.742E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.742E-11

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.927E-17	0.0000	2.170E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.825E-19	0.0000
Pa-231	3.064E-18	0.0000	1.575E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.682E-19	0.0000
Pb-210	8.243E-10	0.0004	4.961E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.185E-08	0.0143
Ra-226	2.008E-06	0.9000	6.150E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.452E-09	0.0029
Ra-228	3.274E-08	0.0147	3.185E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.977E-10	0.0003
Th-228	5.728E-08	0.0257	1.052E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-10	0.0001
Th-230	8.162E-09	0.0037	2.782E-08	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.591E-08	0.0251
Th-232	3.603E-12	0.0000	3.568E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.312E-11	0.0000
U-234	5.580E-21	0.0000	5.031E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.924E-20	0.0000
U-235	5.318E-19	0.0000	1.960E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.395E-21	0.0000
U-238	2.444E-18	0.0000	4.280E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.253E-19	0.0000
Total	2.107E-06	0.9444	2.910E-08	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.505E-08	0.0426

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.987E-17	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.490E-18	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.317E-08	0.0149
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.015E-06	0.9032
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.337E-08	0.0150
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.756E-08	0.0258
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.189E-08	0.0412
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.024E-10	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.382E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.612E-18	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.231E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

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Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years
0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.231E-17	0.0000	3.742E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.502E-19	0.0000
Pb-210	8.218E-29	0.0000	4.517E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.175E-27	0.0000
Ra-226	3.730E-14	0.0000	2.636E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.079E-15	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.017E-06	0.9040	2.893E-08	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.421E-08	0.0422
Th-232	9.003E-08	0.0403	1.728E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.380E-10	0.0004
U-234	1.007E-11	0.0000	1.444E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.703E-13	0.0000
U-235	5.495E-19	0.0000	2.258E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.914E-21	0.0000
U-238	1.289E-15	0.0000	1.849E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.021E-17	0.0000
Total	2.107E-06	0.9444	2.910E-08	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.505E-08	0.0426

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File : C:\RESRAD_FAMILY\RESRAD\7.0\USERFILES\NCPRG2014 1PCI TH230 AF CONC INFANT SOIL.RAD

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.334E-17	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.302E-27	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.841E-14	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.140E-06	0.9592
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.104E-08	0.0408
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.068E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.567E-19	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-15	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.231E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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ATTACHMENT F-2

COMPARISONS OF RADIOLOGICAL CANCER RISKS AND DOSES OBTAINED FOR ST. LOUIS DOWNTOWN SITE DT-10 USING POST-REMEDIAL ACTION REPORT/FINAL STATUS SURVEY EVALUATION VERSUS THOSE OBTAINED USING UPDATED 2014 SLOPE FACTORS AND DOSE CONVERSION FACTORS

(On CD-ROM on the Back Cover of this Report)

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LIST OF TABLES

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Table F-2-1. Radiological Cancer Risk and Dose Comparisons Between PRAR-FSSE Report and Third Five-Year Review Report Evaluations Conducted for SLDS DT-10

Site	Property	Receptor	PRAR-FSSE Report Results[a]		Third Five-Year Review Report Results[b]	
			Risk (Unitless)	Dose (mrem/yr)	Risk (Unitless)	Dose (mrem/yr)
SLDS	DT-10	Resident Gardener (Ground Cover Absent)	1E-04	6	1E-04	6
		Resident Gardener (Ground Cover Present)	6E-05	3	5E-05	3
		Industrial Worker	3E-05	1	3E-05	1
		Utility Worker	6E-08	0.08	6E-08	0.08

[a] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the associateed PRAR-FSSE report [USACE 2010h]). The following RESRAD model version and CSF and DCF libraries were used in the PRAR-FSSE report for DT-10: RESRAD Version 6.3, FGR-13 risk library (morbidity), and FGR-13 dose library (morbidity).

[b] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the supporting RESRAD plot data presented in Tables F-2-2 through F-2-9). The third five-year review of DT-10 radiological risk and dose utilized RESRAD Version 7.0, with the DCFPAK 3.02 risk and dose library (adult), which incorporates the 2014 USEPA cancer slope factor and ICRP-107 DCF updates, respectively.

Table F-2-2. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Hypothetical Resident Gardener via Soil Exposures at the SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	1.52E-06	6.12E-06	3.91E-05	1.15E-06	7.23E-07	2.23E-06	2.94E-06	1.04E-06	2.08E-06	8.31E-06	6.52E-05
1	1.47E-06	5.93E-06	3.92E-05	1.08E-06	5.03E-07	2.35E-06	3.08E-06	1.03E-06	2.08E-06	8.30E-06	6.50E-05
1.30432	1.45E-06	5.87E-06	3.92E-05	1.05E-06	4.50E-07	2.39E-06	3.12E-06	1.03E-06	2.08E-06	8.30E-06	6.50E-05
1.70125	1.43E-06	5.80E-06	3.92E-05	1.02E-06	3.90E-07	2.43E-06	3.17E-06	1.03E-06	2.08E-06	8.30E-06	6.49E-05
2.21898	1.41E-06	5.71E-06	3.93E-05	9.75E-07	3.23E-07	2.50E-06	3.23E-06	1.03E-06	2.08E-06	8.30E-06	6.49E-05
2.89427	1.38E-06	5.59E-06	3.94E-05	9.18E-07	2.53E-07	2.58E-06	3.31E-06	1.03E-06	2.08E-06	8.29E-06	6.48E-05
3	1.37E-06	5.57E-06	3.94E-05	9.09E-07	2.44E-07	2.60E-06	3.32E-06	1.03E-06	2.08E-06	8.29E-06	6.48E-05
3.77505	1.34E-06	5.43E-06	3.94E-05	8.44E-07	1.84E-07	2.69E-06	3.40E-06	1.03E-06	2.08E-06	8.29E-06	6.47E-05
4.92388	1.29E-06	5.24E-06	3.96E-05	7.51E-07	1.21E-07	2.83E-06	3.51E-06	1.03E-06	2.08E-06	8.28E-06	6.47E-05
6.42232	1.22E-06	5.00E-06	3.97E-05	6.39E-07	7.04E-08	3.02E-06	3.64E-06	1.03E-06	2.07E-06	8.27E-06	6.46E-05
8.37678	1.15E-06	4.70E-06	3.98E-05	5.14E-07	3.47E-08	3.27E-06	3.77E-06	1.03E-06	2.07E-06	8.26E-06	6.46E-05
10	1.08E-06	4.46E-06	3.99E-05	4.26E-07	1.92E-08	3.47E-06	3.86E-06	1.03E-06	2.07E-06	8.25E-06	6.46E-05
10.926	1.05E-06	4.33E-06	4.00E-05	3.82E-07	1.38E-08	3.59E-06	3.91E-06	1.03E-06	2.07E-06	8.24E-06	6.46E-05
14.251	9.40E-07	3.90E-06	4.02E-05	2.58E-07	4.12E-09	4.01E-06	4.03E-06	1.03E-06	2.06E-06	8.23E-06	6.47E-05
18.5879	8.13E-07	3.40E-06	4.04E-05	1.53E-07	8.55E-10	4.56E-06	4.14E-06	1.02E-06	2.06E-06	8.20E-06	6.48E-05
24.2446	6.72E-07	2.85E-06	4.06E-05	7.74E-08	1.10E-10	5.28E-06	4.21E-06	1.02E-06	2.05E-06	8.17E-06	6.50E-05
30	5.54E-07	2.37E-06	4.08E-05	3.86E-08	1.36E-11	6.02E-06	4.25E-06	1.02E-06	2.04E-06	8.13E-06	6.52E-05
31.6228	5.24E-07	2.25E-06	4.08E-05	3.17E-08	7.57E-12	6.22E-06	4.26E-06	1.01E-06	2.04E-06	8.12E-06	6.53E-05
41.2463	3.80E-07	1.66E-06	4.09E-05	9.88E-09	2.31E-13	7.46E-06	4.28E-06	1.01E-06	2.03E-06	8.07E-06	6.58E-05
53.7984	2.49E-07	1.12E-06	4.08E-05	2.16E-09	2.44E-15	9.07E-06	4.29E-06	1.00E-06	2.01E-06	8.00E-06	6.65E-05
70.1704	1.44E-07	6.67E-07	4.05E-05	2.98E-10	6.44E-18	1.12E-05	4.29E-06	9.93E-07	1.99E-06	7.90E-06	6.77E-05
91.5247	7.00E-08	3.40E-07	3.99E-05	2.25E-11	2.79E-21	1.39E-05	4.29E-06	9.83E-07	1.96E-06	7.78E-06	6.92E-05
100	5.27E-08	2.60E-07	3.97E-05	8.05E-12	1.29E-22	1.49E-05	4.29E-06	9.79E-07	1.95E-06	7.74E-06	6.99E-05
119.378	2.75E-08	1.41E-07	3.91E-05	7.71E-13	1.15E-25	1.73E-05	4.29E-06	9.71E-07	1.93E-06	7.63E-06	7.14E-05
155.707	8.10E-09	4.48E-08	3.78E-05	9.49E-15	0	2.17E-05	4.29E-06	9.60E-07	1.88E-06	7.43E-06	7.42E-05
203.092	1.65E-09	1.00E-08	3.62E-05	3.06E-17	0	2.72E-05	4.29E-06	9.49E-07	1.83E-06	7.19E-06	7.77E-05
264.897	2.06E-10	1.42E-09	3.41E-05	1.72E-20	0	3.41E-05	4.29E-06	9.44E-07	1.75E-06	6.88E-06	8.21E-05
300	6.35E-11	4.70E-10	3.30E-05	2.46E-22	0	3.78E-05	4.29E-06	9.44E-07	1.71E-06	6.71E-06	8.44E-05
345.511	1.37E-11	1.12E-10	3.16E-05	9.96E-25	0	4.24E-05	4.29E-06	9.48E-07	1.66E-06	6.49E-06	8.74E-05
450.657	4.01E-13	4.03E-12	2.86E-05	0	0	5.23E-05	4.29E-06	9.70E-07	1.55E-06	6.02E-06	9.38E-05
587.802	4.00E-15	5.31E-14	2.52E-05	0	0	6.38E-05	4.29E-06	1.02E-06	1.42E-06	5.46E-06	1.01E-04
766.682	9.79E-18	1.87E-16	2.13E-05	0	0	7.67E-05	4.29E-06	1.13E-06	1.27E-06	4.81E-06	1.09E-04
1,000	3.85E-21	1.18E-19	1.70E-05	0	0	9.06E-05	4.29E-06	1.30E-06	1.09E-06	4.07E-06	1.18E-04
Maximum[c]	0.000001518	0.00000612	4.08674E-05	0.000001147	7.228E-07	9.05541E-05	4.29174E-06	1.29626E-06	0.000002084	8.31E-06	**1.18E-04**

[a] Plot data correspond with Cancer Risk versus Time (Years) plots generated during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of cancer risks.

[c] Maximum values are the maximum single radionuclide cancer risks, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-3. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	0.106700	0.637400	1.65000	0.110100	0.273100	0.088530	0.007290	0.066340	0.090350	0.385900	3.41600
1	0.103143	0.617596	1.66389	0.119812	0.190061	0.0937472	0.0212158	0.0662959	0.0902849	0.385669	3.35171
1.30432	0.102093	0.611689	1.66788	0.121047	0.170204	0.0953434	0.0256358	0.0662819	0.0902662	0.385585	3.33603
1.70125	0.10074	0.604069	1.67301	0.121729	0.147388	0.0974311	0.031448	0.0662638	0.0902418	0.385476	3.3178
2.21898	0.0990027	0.594272	1.6796	0.121313	0.122161	0.100164	0.039039	0.0662401	0.0902101	0.385333	3.29733
2.89427	0.0967811	0.581733	1.688	0.119057	0.0956294	0.103744	0.0488338	0.0662094	0.0901688	0.385147	3.2753
3	0.0964378	0.579794	1.6893	0.118564	0.0920324	0.104306	0.0503482	0.0662046	0.0901623	0.385118	3.27227
3.77505	0.0939582	0.565774	1.69866	0.114081	0.0694847	0.10844	0.061227	0.0661693	0.090115	0.384905	3.25281
4.92388	0.0903996	0.545615	1.71205	0.105553	0.0458117	0.114608	0.0764541	0.0661172	0.0900451	0.38459	3.23124
6.42232	0.0859598	0.520397	1.72868	0.0930191	0.0266077	0.122725	0.0943987	0.0660496	0.0899543	0.384178	3.21197
8.37678	0.0804949	0.489247	1.74902	0.07681	0.0130987	0.133426	0.114383	0.0659618	0.0898366	0.383642	3.19592
10	0.0762212	0.464798	1.76481	0.064604	0.0072713	0.142405	0.128195	0.0658892	0.0897393	0.383198	3.18713
10.926	0.0738856	0.451402	1.77339	0.0583118	0.0051974	0.147563	0.13505	0.065848	0.089684	0.382945	3.18328
14.251	0.0660736	0.406405	1.80179	0.039812	0.0015566	0.166279	0.154508	0.065701	0.0894867	0.382036	3.17365
18.5879	0.0571119	0.354386	1.83367	0.0238069	0.000323	0.191103	0.170796	0.0655116	0.0892317	0.380855	3.1668
24.2446	0.0472239	0.296409	1.86762	0.0120554	4.15E-05	0.224071	0.182577	0.0652686	0.088903	0.379319	3.16349
30	0.0389186	0.247146	1.89463	0.0060127	5.15E-06	0.258162	0.188604	0.0650259	0.0885724	0.377763	3.16484
31.6228	0.0368528	0.234799	1.90105	0.0049409	2.86E-06	0.267857	0.189672	0.0649583	0.0884799	0.377325	3.16594
41.2463	0.026669	0.173263	1.93016	0.0015415	8.73E-08	0.325919	0.193056	0.0645655	0.0879361	0.374741	3.17785
53.7984	0.0174903	0.116559	1.95001	0.0003373	9.21E-10	0.40262	0.194254	0.0640732	0.0872379	0.371396	3.20398
70.1704	0.0100886	0.0695016	1.95536	4.65E-05	2.43E-12	0.503302	0.194542	0.0634652	0.0863423	0.367079	3.24973
91.5247	0.004922	0.0354086	1.94181	3.50E-06	1.06E-15	0.634317	0.194582	0.0627296	0.0851944	0.361523	3.32049
100	0.003702	0.0270935	1.93258	1.26E-06	4.88E-17	0.68597	0.194583	0.0624554	0.0847442	0.359341	3.35047
119.378	0.0019302	0.0146923	1.90682	1.20E-07	4.34E-20	0.803001	0.194582	0.0618657	0.083725	0.354402	3.42102
155.707	0.0005693	0.0046646	1.84992	1.48E-09	8.25E-26	1.01764	0.194578	0.0608955	0.0818494	0.345325	3.55544
203.092	0.0001158	0.0010445	1.77161	4.77E-12	0	1.28731	0.194573	0.0598828	0.0794663	0.333834	3.72784
264.897	1.45E-05	0.0001483	1.6718	2.69E-15	0	1.62146	0.194565	0.0589611	0.0764601	0.319419	3.94283
300	4.46E-06	4.90E-05	1.61736	3.84E-17	0	1.80266	0.194561	0.0586242	0.0748023	0.311511	4.05957
345.511	9.66E-07	1.16E-05	1.54933	1.55E-19	0	2.02869	0.194556	0.0583737	0.0727051	0.301549	4.20522
450.657	2.82E-08	4.20E-07	1.40286	4.60E-25	0	2.51472	0.194544	0.0585222	0.0680767	0.279735	4.51846
587.802	2.81E-10	5.53E-09	1.23242	0	0	3.07923	0.194528	0.0600141	0.0624694	0.253639	4.8823
766.682	6.88E-13	1.95E-11	1.04083	0	0	3.71203	0.194507	0.0636798	0.0558291	0.223229	5.2901

Table F-2-3. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
1,000	2.70E-16	1.23E-14	0.834968	0	0	4.3891	0.19448	0.0705081	0.048196	0.188983	5.72624
Maximum [c]	0.106700	0.637400	1.95536	0.121729	0.273100	4.3891	0.194583	0.0705081	0.09035	0.385900	**5.72624**

[a] Plot data correspond with Radiological Dose versus Time (Years) plots generated.during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of doses.

[c] Maximum values are the maximum single radionuclide doses, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-4. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Present)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	1.64E-07	4.49E-06	1.09E-05	3.66E-07	1.58E-07	6.30E-07	9.60E-07	5.50E-07	1.16E-07	1.53E-06	1.99E-05
1	1.59E-07	4.35E-06	1.10E-05	3.38E-07	1.10E-07	6.64E-07	1.00E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
1.30432	1.57E-07	4.31E-06	1.11E-05	3.29E-07	9.87E-08	6.75E-07	1.01E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
1.70125	1.55E-07	4.25E-06	1.11E-05	3.17E-07	8.55E-08	6.89E-07	1.03E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
2.21898	1.53E-07	4.18E-06	1.11E-05	3.02E-07	7.09E-08	7.07E-07	1.05E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
2.89427	1.49E-07	4.10E-06	1.12E-05	2.82E-07	5.55E-08	7.31E-07	1.07E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
3	1.49E-07	4.08E-06	1.12E-05	2.79E-07	5.34E-08	7.35E-07	1.08E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
3.77505	1.45E-07	3.98E-06	1.13E-05	2.58E-07	4.04E-08	7.63E-07	1.10E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
4.92388	1.40E-07	3.84E-06	1.14E-05	2.28E-07	2.66E-08	8.04E-07	1.14E-06	5.49E-07	1.16E-07	1.53E-06	1.98E-05
6.42232	1.33E-07	3.67E-06	1.15E-05	1.93E-07	1.55E-08	8.59E-07	1.18E-06	5.48E-07	1.16E-07	1.53E-06	1.97E-05
8.37678	1.25E-07	3.45E-06	1.17E-05	1.55E-07	7.63E-09	9.31E-07	1.22E-06	5.48E-07	1.16E-07	1.53E-06	1.97E-05
10	1.18E-07	3.28E-06	1.18E-05	1.28E-07	4.24E-09	9.92E-07	1.25E-06	5.48E-07	1.16E-07	1.53E-06	1.97E-05
10.926	1.15E-07	3.18E-06	1.19E-05	1.15E-07	3.03E-09	1.03E-06	1.26E-06	5.47E-07	1.16E-07	1.53E-06	1.97E-05
14.251	1.03E-07	2.87E-06	1.21E-05	7.74E-08	9.09E-10	1.15E-06	1.30E-06	5.47E-07	1.17E-07	1.53E-06	1.98E-05
18.5879	8.92E-08	2.50E-06	1.23E-05	4.60E-08	1.89E-10	1.32E-06	1.33E-06	5.46E-07	1.17E-07	1.53E-06	1.98E-05
24.2446	7.40E-08	2.09E-06	1.26E-05	2.33E-08	2.44E-11	1.55E-06	1.36E-06	5.45E-07	1.17E-07	1.52E-06	1.99E-05
30	6.13E-08	1.75E-06	1.28E-05	1.16E-08	3.04E-12	1.78E-06	1.37E-06	5.44E-07	1.17E-07	1.52E-06	2.00E-05
31.6228	5.81E-08	1.66E-06	1.29E-05	9.56E-09	1.69E-12	1.85E-06	1.37E-06	5.44E-07	1.17E-07	1.52E-06	2.00E-05
41.2463	4.24E-08	1.23E-06	1.31E-05	2.99E-09	5.17E-14	2.25E-06	1.39E-06	5.42E-07	1.18E-07	1.52E-06	2.02E-05
53.7984	2.80E-08	8.27E-07	1.33E-05	6.58E-10	5.50E-16	2.78E-06	1.39E-06	5.40E-07	1.19E-07	1.52E-06	2.05E-05
70.1704	1.64E-08	4.94E-07	1.34E-05	9.12E-11	1.47E-18	3.49E-06	1.40E-06	5.38E-07	1.19E-07	1.51E-06	2.10E-05
91.5247	8.12E-09	2.52E-07	1.34E-05	6.93E-12	6.43E-22	4.43E-06	1.41E-06	5.35E-07	1.21E-07	1.51E-06	2.17E-05
100	6.15E-09	1.93E-07	1.34E-05	2.49E-12	2.99E-23	4.80E-06	1.42E-06	5.34E-07	1.21E-07	1.50E-06	2.20E-05
119.378	3.26E-09	1.05E-07	1.33E-05	2.40E-13	2.68E-26	5.65E-06	1.43E-06	5.32E-07	1.22E-07	1.50E-06	2.27E-05
155.707	9.87E-10	3.36E-08	1.31E-05	3.00E-15	0	7.25E-06	1.44E-06	5.29E-07	1.24E-07	1.49E-06	2.40E-05
203.092	2.08E-10	7.57E-09	1.27E-05	9.85E-18	0	9.31E-06	1.47E-06	5.27E-07	1.27E-07	1.48E-06	2.57E-05
264.897	2.74E-11	1.08E-09	1.23E-05	5.68E-21	0	1.20E-05	1.50E-06	5.26E-07	1.31E-07	1.46E-06	2.79E-05
300	8.65E-12	3.59E-10	1.20E-05	8.21E-23	0	1.35E-05	1.52E-06	5.27E-07	1.33E-07	1.45E-06	2.91E-05
345.511	1.94E-12	8.59E-11	1.17E-05	3.38E-25	0	1.54E-05	1.55E-06	5.30E-07	1.36E-07	1.44E-06	3.08E-05
450.657	6.17E-14	3.15E-12	1.10E-05	0	0	1.98E-05	1.61E-06	5.43E-07	1.43E-07	1.42E-06	3.45E-05
587.802	6.86E-16	4.22E-14	1.02E-05	0	0	2.55E-05	1.69E-06	5.70E-07	1.52E-07	1.38E-06	3.94E-05
766.682	1.94E-18	1.52E-16	9.16E-06	0	0	3.28E-05	1.81E-06	6.26E-07	1.66E-07	1.34E-06	4.59E-05

Table F-2-4. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Present)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
1,000	9.29E-22	9.89E-20	8.04E-06	0	0	4.25E-05	1.98E-06	7.31E-07	1.85E-07	1.30E-06	5.47E-05
Maximum[c]	1.642E-07	4.486E-06	1.344E-05	3.663E-07	1.583E-07	4.246E-05	1.983E-06	7.306E-07	1.853E-07	1.53E-06	**5.47E-05**

[a] Plot data correspond with Cancer Risk versus Time (Years) plots generated during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of cancer risks.

[c] Maximum values are the maximum single radionuclide cancer risks, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-5. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Present)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	0.014140	0.466100	0.467300	0.049380	0.059630	0.030280	0.003170	0.035330	0.005451	0.072520	1.20300
1	0.013683	0.451721	0.478121	0.0486341	0.0415171	0.0317831	0.0090738	0.035317	0.0054538	0.0725114	1.18782
1.30432	0.0135465	0.44742	0.481304	0.0480951	0.0371857	0.0322498	0.0108492	0.0353132	0.0054547	0.0725075	1.18393
1.70125	0.0133705	0.441872	0.485407	0.0472333	0.0322079	0.0328631	0.0131317	0.0353082	0.0054558	0.0725023	1.17935
2.21898	0.0131444	0.434739	0.490678	0.0458955	0.0267027	0.0336708	0.0160408	0.0353017	0.0054574	0.0724956	1.17413
2.89427	0.0128552	0.425607	0.49742	0.0438897	0.0209109	0.0347373	0.0196999	0.0352932	0.0054594	0.0724868	1.16836
3	0.0128105	0.424195	0.498461	0.043556	0.0201255	0.0349057	0.0202578	0.0352919	0.0054597	0.0724854	1.16755
3.77505	0.0124875	0.413984	0.505988	0.0410062	0.0152012	0.0361501	0.0242138	0.0352822	0.0054621	0.0724753	1.16225
4.92388	0.0120237	0.3993	0.516795	0.0370697	0.0100285	0.0380285	0.0296291	0.0352678	0.0054656	0.0724604	1.15607
6.42232	0.0114446	0.380927	0.530283	0.0320243	0.0058294	0.0405371	0.0358789	0.0352492	0.0054702	0.0724409	1.15008
8.37678	0.0107309	0.358228	0.546891	0.0260357	0.0028728	0.0439039	0.0427239	0.035225	0.0054762	0.0724155	1.1445
10	0.0101721	0.340407	0.559882	0.0217305	0.0015961	0.0467772	0.0474077	0.0352049	0.0054813	0.0723944	1.14105
10.926	0.0098664	0.33064	0.566982	0.0195546	0.0011415	0.0484462	0.049723	0.0351936	0.0054842	0.0723824	1.13941
14.251	0.0088427	0.297825	0.590722	0.0132699	0.0003425	0.0546069	0.0562774	0.035153	0.0054948	0.0723392	1.13487
18.5879	0.0076654	0.259867	0.617918	0.0079174	7.12E-05	0.0630017	0.0617746	0.0351006	0.0055089	0.0722829	1.13111
24.2446	0.0063621	0.217531	0.647812	0.0040108	9.19E-06	0.0744795	0.0658001	0.0350335	0.0055276	0.0722095	1.12878
30	0.0052633	0.181529	0.672729	0.0020035	1.14E-06	0.0866733	0.0679214	0.0349665	0.0055469	0.0721349	1.12877
31.6228	0.0049893	0.172501	0.678882	0.0016471	6.35E-07	0.0901925	0.0683103	0.0349478	0.0055525	0.0721139	1.12914
41.2463	0.0036337	0.127469	0.70876	0.0005155	1.95E-08	0.111669	0.0696391	0.0348395	0.0055855	0.0719892	1.1341
53.7984	0.0024031	0.0859075	0.734402	0.0001133	2.07E-10	0.140876	0.0703041	0.0347043	0.0056293	0.0718268	1.14617
70.1704	0.0014013	0.0513458	0.752627	1.57E-05	5.52E-13	0.180263	0.0707487	0.0345387	0.0056873	0.0716153	1.16824
91.5247	0.0006935	0.0262392	0.760989	1.19E-06	2.42E-16	0.232796	0.0712203	0.0343414	0.0057636	0.0713401	1.20338
100	0.0005246	0.0201018	0.761373	4.28E-07	1.13E-17	0.253823	0.0714039	0.034269	0.0057939	0.0712311	1.21852
119.378	0.0002771	0.0109311	0.758565	4.13E-08	1.01E-20	0.302022	0.0718249	0.034116	0.0058634	0.0709823	1.25458
155.707	8.37E-05	0.0034885	0.746077	5.14E-10	1.96E-26	0.39222	0.0726241	0.0338763	0.0059935	0.0705179	1.32488
203.092	1.76E-05	0.0007864	0.725049	1.69E-12	0	0.50868	0.0736877	0.0336543	0.0061624	0.0699163	1.41795
264.897	2.30E-06	0.0001126	0.696579	9.69E-16	0	0.658039	0.0751122	0.0335142	0.0063816	0.0691394	1.53888
300	7.23E-07	3.74E-05	0.680744	1.40E-17	0	0.741591	0.0759406	0.0335078	0.0065057	0.0687025	1.60703

Table F-2-5. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident Gardener via Soil Exposures at SLDS Property DT-10 (Ground Cover Present)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
345.511	1.62E-07	8.93E-06	0.660757	5.76E-20	0	0.84861	0.0770361	0.033576	0.0066663	0.0681411	1.6948
450.657	5.07E-09	3.27E-07	0.616999	1.77E-25	0	1.09073	0.0796638	0.0340518	0.0070375	0.0668683	1.89535
587.802	5.56E-11	4.39E-09	0.564731	0	0	1.39738	0.0833068	0.0353045	0.0075256	0.0652647	2.15351
766.682	1.55E-13	1.58E-11	0.503941	0	0	1.78575	0.0884616	0.03794	0.0081785	0.0632834	2.48755
1,000	7.23E-17	1.03E-14	0.435638	0	0	2.28106	0.0959655	0.0429597	0.0090778	0.0609144	2.92562
Maximum[c]	0.014140	0.466100	0.761373	0.04938	0.059630	2.28106	0.0959655	0.0429597	0.0090778	0.072520	**2.92562**

[a] Plot data correspond with Radiological Dose versus Time (Years) plots generated.during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of doses.

[c] Maximum values are the maximum single radionuclide doses, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-6. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to an Industrial Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	4.52E-07	2.53E-07	9.43E-06	3.08E-07	2.46E-07	4.88E-07	6.16E-07	1.86E-07	5.86E-07	2.20E-06	1.48E-05
1	4.37E-07	2.45E-07	9.42E-06	2.93E-07	1.71E-07	5.18E-07	6.52E-07	1.86E-07	5.85E-07	2.20E-06	1.47E-05
1.30432	4.33E-07	2.43E-07	9.42E-06	2.87E-07	1.54E-07	5.27E-07	6.63E-07	1.86E-07	5.85E-07	2.20E-06	1.47E-05
1.70125	4.27E-07	2.40E-07	9.42E-06	2.79E-07	1.33E-07	5.39E-07	6.76E-07	1.86E-07	5.85E-07	2.20E-06	1.47E-05
2.21898	4.20E-07	2.36E-07	9.42E-06	2.69E-07	1.10E-07	5.54E-07	6.93E-07	1.86E-07	5.85E-07	2.20E-06	1.47E-05
2.89427	4.10E-07	2.31E-07	9.42E-06	2.54E-07	8.63E-08	5.74E-07	7.14E-07	1.86E-07	5.85E-07	2.19E-06	1.47E-05
3	4.09E-07	2.30E-07	9.42E-06	2.52E-07	8.30E-08	5.77E-07	7.18E-07	1.86E-07	5.85E-07	2.19E-06	1.47E-05
3.77505	3.98E-07	2.24E-07	9.42E-06	2.35E-07	6.27E-08	6.00E-07	7.40E-07	1.86E-07	5.84E-07	2.19E-06	1.46E-05
4.92388	3.83E-07	2.16E-07	9.41E-06	2.10E-07	4.13E-08	6.34E-07	7.71E-07	1.85E-07	5.84E-07	2.19E-06	1.46E-05
6.42232	3.64E-07	2.06E-07	9.41E-06	1.80E-07	2.40E-08	6.79E-07	8.06E-07	1.85E-07	5.83E-07	2.19E-06	1.46E-05
8.37678	3.41E-07	1.94E-07	9.40E-06	1.45E-07	1.18E-08	7.37E-07	8.45E-07	1.85E-07	5.82E-07	2.19E-06	1.46E-05
10	3.23E-07	1.84E-07	9.39E-06	1.20E-07	6.56E-09	7.85E-07	8.70E-07	1.85E-07	5.82E-07	2.18E-06	1.46E-05
10.926	3.13E-07	1.79E-07	9.39E-06	1.08E-07	4.69E-09	8.12E-07	8.83E-07	1.85E-07	5.81E-07	2.18E-06	1.46E-05
14.251	2.80E-07	1.61E-07	9.37E-06	7.30E-08	1.40E-09	9.10E-07	9.19E-07	1.84E-07	5.80E-07	2.18E-06	1.47E-05
18.5879	2.42E-07	1.41E-07	9.35E-06	4.34E-08	2.91E-10	1.04E-06	9.49E-07	1.84E-07	5.78E-07	2.17E-06	1.47E-05
24.2446	2.00E-07	1.18E-07	9.32E-06	2.19E-08	3.75E-11	1.20E-06	9.70E-07	1.83E-07	5.76E-07	2.16E-06	1.48E-05
30	1.65E-07	9.80E-08	9.28E-06	1.09E-08	4.65E-12	1.37E-06	9.81E-07	1.83E-07	5.74E-07	2.15E-06	1.48E-05
31.6228	1.56E-07	9.31E-08	9.27E-06	8.99E-09	2.58E-12	1.42E-06	9.83E-07	1.82E-07	5.73E-07	2.15E-06	1.48E-05
41.2463	1.13E-07	6.87E-08	9.20E-06	2.80E-09	7.88E-14	1.70E-06	9.89E-07	1.81E-07	5.70E-07	2.14E-06	1.50E-05
53.7984	7.41E-08	4.62E-08	9.11E-06	6.14E-10	8.31E-16	2.06E-06	9.92E-07	1.80E-07	5.65E-07	2.12E-06	1.51E-05
70.1704	4.28E-08	2.76E-08	8.99E-06	8.46E-11	2.20E-18	2.53E-06	9.92E-07	1.79E-07	5.59E-07	2.09E-06	1.54E-05
91.5247	2.09E-08	1.40E-08	8.82E-06	6.37E-12	9.52E-22	3.13E-06	9.92E-07	1.77E-07	5.51E-07	2.06E-06	1.58E-05
100	1.57E-08	1.07E-08	8.75E-06	2.28E-12	4.41E-23	3.36E-06	9.92E-07	1.77E-07	5.48E-07	2.05E-06	1.59E-05
119.378	8.18E-09	5.83E-09	8.59E-06	2.19E-13	3.91E-26	3.89E-06	9.92E-07	1.76E-07	5.41E-07	2.02E-06	1.62E-05
155.707	2.41E-09	1.85E-09	8.31E-06	2.69E-15	0	4.85E-06	9.92E-07	1.74E-07	5.29E-07	1.97E-06	1.68E-05
203.092	4.91E-10	4.14E-10	7.94E-06	8.69E-18	0	6.06E-06	9.92E-07	1.73E-07	5.13E-07	1.90E-06	1.76E-05
264.897	6.15E-11	5.88E-11	7.49E-06	4.89E-21	0	7.56E-06	9.92E-07	1.73E-07	4.92E-07	1.82E-06	1.85E-05
300	1.89E-11	1.94E-11	7.25E-06	6.98E-23	0	8.37E-06	9.92E-07	1.74E-07	4.81E-07	1.78E-06	1.90E-05
345.511	4.10E-12	4.61E-12	6.94E-06	2.83E-25	0	9.39E-06	9.92E-07	1.76E-07	4.67E-07	1.72E-06	1.97E-05
450.657	1.20E-13	1.67E-13	6.29E-06	0	0	1.16E-05	9.92E-07	1.84E-07	4.36E-07	1.59E-06	2.11E-05
587.802	1.19E-15	2.19E-15	5.52E-06	0	0	1.41E-05	9.92E-07	1.99E-07	3.99E-07	1.45E-06	2.27E-05

Table F-2-6. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to an Industrial Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
766.682	2.92E-18	7.71E-18	4.67E-06	0	0	1.69E-05	9.92E-07	2.24E-07	3.55E-07	1.27E-06	2.44E-05
1,000	1.15E-21	4.87E-21	3.74E-06	0	0	2.00E-05	9.92E-07	2.66E-07	3.05E-07	1.08E-06	2.63E-05
Maximum[c]	4.522E-07	2.528E-07	0.000009428	3.077E-07	2.464E-07	1.99645E-05	9.92102E-07	2.65612E-07	5.857E-07	2.20E-06	**2.63E-05**

[a] Plot data correspond with Cancer Risk versus Time (Years) plots generated during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of cancer risks.

[c] Maximum values are the maximum single radionuclide cancer risks, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-7. Summary of RESRAD 7.0 Plot Data for Radiological Dose to an Industrial Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	0.035090	0.029210	0.472900	0.021860	0.093110	0.037610	0.001667	0.012400	0.030210	0.121200	0.855300
1	0.0339332	0.0283033	0.473174	0.0269633	0.0647891	0.0390989	0.0046457	0.0123956	0.0301861	0.121147	0.834636
1.30432	0.0335879	0.0280326	0.473243	0.0278862	0.0580201	0.0395523	0.0056525	0.0123931	0.0301796	0.12112	0.829667
1.70125	0.0331428	0.0276834	0.473329	0.0287463	0.0502425	0.0401438	0.0070089	0.0123899	0.0301713	0.121086	0.823944
2.21898	0.0325711	0.0272345	0.473437	0.0293791	0.041643	0.0409154	0.0088253	0.0123857	0.0301604	0.121041	0.817592
2.89427	0.0318403	0.0266598	0.47357	0.0295501	0.0325988	0.0419221	0.0112282	0.0123802	0.0301462	0.120983	0.810879
3	0.0317273	0.0265709	0.47359	0.0295223	0.0313726	0.0420797	0.0116047	0.0123794	0.0301439	0.120974	0.809965
3.77505	0.0309115	0.0259284	0.473729	0.0289699	0.0236864	0.0432355	0.0143415	0.0123731	0.0301277	0.120907	0.80421
4.92388	0.0297408	0.0250046	0.473913	0.0273507	0.0156166	0.0449492	0.0182498	0.0123639	0.0301037	0.120807	0.798099
6.42232	0.0282801	0.0238489	0.474116	0.0245099	0.0090702	0.0471853	0.0229411	0.0123519	0.0300725	0.120678	0.793054
8.37678	0.0264822	0.0224213	0.47432	0.0205012	0.0044652	0.0501032	0.028243	0.0123364	0.030032	0.12051	0.789414
10	0.0250762	0.0213009	0.474439	0.0173541	0.0024787	0.0525273	0.0319419	0.0123236	0.0299986	0.12037	0.78781
10.926	0.0243078	0.020687	0.474488	0.0157042	0.0017717	0.0539104	0.033786	0.0123164	0.0299796	0.12029	0.787241
14.251	0.0217377	0.0186248	0.474557	0.0107809	0.0005306	0.0588774	0.0390416	0.0122906	0.0299117	0.120005	0.786357
18.5879	0.0187894	0.0162409	0.474416	0.0064648	0.0001101	0.0653554	0.043459	0.0122575	0.029824	0.119634	0.786551
24.2446	0.0155363	0.0135839	0.473891	0.0032772	1.42E-05	0.0737986	0.0466602	0.0122154	0.029711	0.119151	0.787839
30	0.0128039	0.0113263	0.473024	0.001635	1.76E-06	0.0823758	0.0482988	0.0121736	0.0295972	0.118662	0.789898
31.6228	0.0121243	0.0107604	0.472727	0.0013436	9.75E-07	0.0847911	0.0485892	0.012162	0.0295654	0.118525	0.790589
41.2463	0.0087739	0.0079403	0.470571	0.0004192	2.98E-08	0.0990777	0.0495096	0.0120951	0.0293782	0.117713	0.795478
53.7984	0.0057542	0.0053417	0.466977	9.17E-05	3.14E-10	0.117597	0.0498354	0.0120124	0.0291379	0.116662	0.803409
70.1704	0.0033191	0.0031851	0.461428	1.26E-05	8.30E-13	0.141513	0.0499136	0.0119122	0.0288296	0.115305	0.815418
91.5247	0.0016193	0.0016227	0.453383	9.53E-07	3.60E-16	0.172243	0.0499247	0.0117944	0.0284346	0.11356	0.832583
100	0.0012179	0.0012417	0.450055	3.42E-07	1.66E-17	0.184285	0.049925	0.0117515	0.0282797	0.112874	0.83963
119.378	0.000635	0.0006733	0.442317	3.27E-08	1.48E-20	0.211475	0.0499247	0.0116617	0.0279292	0.111322	0.855938
155.707	0.0001873	0.0002138	0.427738	4.02E-10	2.81E-26	0.26116	0.0499237	0.011523	0.0272845	0.10847	0.8865
203.092	3.81E-05	4.79E-05	0.409137	1.30E-12	0	0.323456	0.0499223	0.0113972	0.0264662	0.10486	0.925325
264.897	4.77E-06	6.80E-06	0.385967	7.31E-16	0	0.400593	0.0499204	0.01132	0.0254353	0.100331	0.973578
300	1.47E-06	2.24E-06	0.373383	1.04E-17	0	0.442416	0.0499194	0.0113165	0.0248675	0.097846	0.999752

Table F-2-7. Summary of RESRAD 7.0 Plot Data for Radiological Dose to an Industrial Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
345.511	3.18E-07	5.33E-07	0.357673	4.22E-20	0	0.494586	0.049918	0.0113523	0.0241499	0.094716	1.0324
450.657	9.28E-09	1.93E-08	0.323858	1.25E-25	0	0.606761	0.0499148	0.0115914	0.022569	0.0878624	1.10256
587.802	9.24E-11	2.53E-10	0.28451	0	0	0.737047	0.0499107	0.0121808	0.0206593	0.0796634	1.18397
766.682	2.26E-13	8.91E-13	0.240281	0	0	0.883086	0.0499054	0.0133122	0.0184059	0.0701089	1.2751
1,000	8.90E-17	5.62E-16	0.192757	0	0	1.03933	0.0498984	0.0152093	0.0158272	0.0593494	1.37237
Maximum[c]	0.035090	0.029210	0.474557	0.0295501	0.093110	1.03933	0.049925	0.0152093	0.03021	0.121200	**1.37237**

[a] Plot data correspond with Radiological Dose versus Time (Years) plots generated.during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of doses.

[c] Maximum values are the maximum single radionuclide doses, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-8. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Utility Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	1.37E-09	1.87E-09	1.89E-08	8.91E-10	3.75E-09	5.08E-10	5.66E-11	7.82E-10	1.20E-09	4.90E-09	3.42E-08
1	1.32E-09	1.81E-09	1.89E-08	1.09E-09	2.61E-09	5.68E-10	1.78E-10	7.82E-10	1.20E-09	4.90E-09	3.34E-08
1.30432	1.31E-09	1.79E-09	1.89E-08	1.13E-09	2.33E-09	5.86E-10	2.19E-10	7.82E-10	1.19E-09	4.90E-09	3.32E-08
1.70125	1.29E-09	1.77E-09	1.89E-08	1.17E-09	2.02E-09	6.10E-10	2.74E-10	7.81E-10	1.19E-09	4.90E-09	3.30E-08
2.21898	1.27E-09	1.74E-09	1.90E-08	1.19E-09	1.68E-09	6.41E-10	3.47E-10	7.81E-10	1.19E-09	4.89E-09	3.27E-08
2.89427	1.24E-09	1.70E-09	1.90E-08	1.20E-09	1.31E-09	6.81E-10	4.45E-10	7.81E-10	1.19E-09	4.89E-09	3.24E-08
3	1.24E-09	1.70E-09	1.90E-08	1.20E-09	1.26E-09	6.87E-10	4.60E-10	7.81E-10	1.19E-09	4.89E-09	3.24E-08
3.77505	1.21E-09	1.66E-09	1.90E-08	1.17E-09	9.53E-10	7.34E-10	5.71E-10	7.80E-10	1.19E-09	4.89E-09	3.21E-08
4.92388	1.16E-09	1.60E-09	1.90E-08	1.11E-09	6.28E-10	8.02E-10	7.29E-10	7.80E-10	1.19E-09	4.89E-09	3.19E-08
6.42232	1.10E-09	1.52E-09	1.90E-08	9.91E-10	3.65E-10	8.92E-10	9.18E-10	7.79E-10	1.19E-09	4.88E-09	3.17E-08
8.37678	1.03E-09	1.43E-09	1.91E-08	8.29E-10	1.80E-10	1.01E-09	1.13E-09	7.78E-10	1.19E-09	4.87E-09	3.15E-08
10	9.78E-10	1.36E-09	1.91E-08	7.01E-10	9.97E-11	1.11E-09	1.28E-09	7.77E-10	1.19E-09	4.87E-09	3.15E-08
10.926	9.48E-10	1.32E-09	1.91E-08	6.35E-10	7.13E-11	1.16E-09	1.36E-09	7.76E-10	1.19E-09	4.86E-09	3.14E-08
14.251	8.48E-10	1.19E-09	1.92E-08	4.36E-10	2.13E-11	1.36E-09	1.57E-09	7.75E-10	1.18E-09	4.85E-09	3.14E-08
18.5879	7.33E-10	1.04E-09	1.92E-08	2.61E-10	4.43E-12	1.63E-09	1.75E-09	7.72E-10	1.18E-09	4.84E-09	3.14E-08
24.2446	6.06E-10	8.68E-10	1.92E-08	1.32E-10	5.70E-13	1.97E-09	1.88E-09	7.69E-10	1.18E-09	4.82E-09	3.14E-08
30	4.99E-10	7.24E-10	1.92E-08	6.61E-11	7.07E-14	2.32E-09	1.94E-09	7.67E-10	1.17E-09	4.80E-09	3.15E-08
31.6228	4.73E-10	6.87E-10	1.92E-08	5.43E-11	3.92E-14	2.41E-09	1.96E-09	7.66E-10	1.17E-09	4.79E-09	3.15E-08
41.2463	3.42E-10	5.07E-10	1.92E-08	1.69E-11	1.20E-15	3.00E-09	1.99E-09	7.61E-10	1.16E-09	4.76E-09	3.17E-08
53.7984	2.24E-10	3.41E-10	1.91E-08	3.71E-12	1.26E-17	3.75E-09	2.01E-09	7.55E-10	1.15E-09	4.72E-09	3.20E-08
70.1704	1.29E-10	2.03E-10	1.89E-08	5.11E-13	3.34E-20	4.73E-09	2.01E-09	7.47E-10	1.14E-09	4.66E-09	3.25E-08
91.5247	6.31E-11	1.04E-10	1.86E-08	3.85E-14	1.45E-23	5.99E-09	2.01E-09	7.38E-10	1.13E-09	4.59E-09	3.32E-08
100	4.75E-11	7.93E-11	1.85E-08	1.38E-14	6.70E-25	6.48E-09	2.01E-09	7.35E-10	1.12E-09	4.56E-09	3.35E-08
119.378	2.48E-11	4.30E-11	1.82E-08	1.32E-15	5.95E-28	7.60E-09	2.01E-09	7.27E-10	1.11E-09	4.50E-09	3.42E-08
155.707	7.30E-12	1.37E-11	1.76E-08	1.63E-17	0	9.64E-09	2.01E-09	7.14E-10	1.08E-09	4.39E-09	3.54E-08
203.092	1.49E-12	3.06E-12	1.68E-08	5.25E-20	0	1.22E-08	2.01E-09	7.00E-10	1.05E-09	4.24E-09	3.70E-08
264.897	1.86E-13	4.34E-13	1.59E-08	2.95E-23	0	1.54E-08	2.01E-09	6.86E-10	1.01E-09	4.06E-09	3.90E-08
300	5.72E-14	1.43E-13	1.53E-08	4.22E-25	0	1.71E-08	2.01E-09	6.79E-10	9.83E-10	3.96E-09	4.00E-08

Table F-2-8. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Utility Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
345.511	1.24E-14	3.40E-14	1.47E-08	1.71E-27	0	1.92E-08	2.01E-09	6.73E-10	9.54E-10	3.83E-09	4.14E-08
450.657	3.62E-16	1.23E-15	1.33E-08	0	0	2.38E-08	2.01E-09	6.66E-10	8.91E-10	3.55E-09	4.43E-08
587.802	3.60E-18	1.62E-17	1.17E-08	0	0	2.92E-08	2.01E-09	6.69E-10	8.15E-10	3.22E-09	4.76E-08
766.682	8.83E-21	5.70E-20	9.87E-09	0	0	3.52E-08	2.01E-09	6.92E-10	7.26E-10	2.84E-09	5.13E-08
1,000	3.47E-24	3.59E-23	7.92E-09	0	0	4.16E-08	2.01E-09	7.43E-10	6.23E-10	2.40E-09	5.53E-08
Maximum[c]	1.368E-09	1.866E-09	1.923E-08	1.197E-09	3.745E-09	4.161E-08	2.009E-09	7.824E-10	1.196E-09	4.90E-09	**5.53E-08**

[a] Plot data correspond with Cancer Risk versus Time (Years) plots generated during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of cancer risks.

[c] Maximum values are the maximum single radionuclide cancer risks, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-2-9. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Utility Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	Pb-210	Ra-226	Ra-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Total
0	0.001902	0.003808	0.023750	0.001135	0.004652	0.003608	0.000106	0.001377	0.001541	0.006746	0.048630
1	0.0018395	0.0036899	0.023822	0.0013848	0.003237	0.0036832	0.0002593	0.001376	0.0015395	0.0067407	0.0475719
1.30432	0.0018207	0.0036546	0.0238418	0.0014296	0.0028988	0.003706	0.000311	0.0013757	0.0015391	0.0067392	0.0473167
1.70125	0.0017966	0.0036091	0.0238673	0.0014709	0.0025102	0.0037359	0.0003804	0.0013754	0.0015387	0.0067373	0.0470218
2.21898	0.0017656	0.0035506	0.0238999	0.0015004	0.0020806	0.0037748	0.0004733	0.0013749	0.0015382	0.0067348	0.046693
2.89427	0.001726	0.0034757	0.0239413	0.0015064	0.0016287	0.0038256	0.0005959	0.0013743	0.0015375	0.0067316	0.0463428
3	0.0017199	0.0034641	0.0239476	0.0015046	0.0015674	0.0038336	0.0006151	0.0013742	0.0015373	0.0067311	0.0462948
3.77505	0.0016757	0.0033803	0.0239934	0.0014743	0.0011834	0.0038921	0.0007545	0.0013735	0.0015365	0.0067273	0.045991
4.92388	0.0016122	0.0032599	0.0240584	0.0013899	0.0007802	0.0039789	0.0009532	0.0013724	0.0015353	0.0067218	0.0456623
6.42232	0.001533	0.0031092	0.0241382	0.0012441	0.0004532	0.0040926	0.0011915	0.0013711	0.0015337	0.0067146	0.0453812
8.37678	0.0014356	0.0029231	0.0242342	0.0010397	0.0002231	0.0042414	0.0014605	0.0013693	0.0015317	0.0067053	0.0451637
10	0.0013593	0.002777	0.0243075	0.0008797	0.0001238	0.0043654	0.001648	0.0013678	0.00153	0.0066975	0.0450561
10.926	0.0013177	0.002697	0.0243467	0.000796	8.85E-05	0.0044363	0.0017415	0.001367	0.001529	0.0066931	0.0450127
14.251	0.0011784	0.0024281	0.0244733	0.0005462	2.65E-05	0.0046918	0.0020078	0.001364	0.0015256	0.0066772	0.0449189
18.5879	0.0010185	0.0021173	0.0246077	0.0003275	5.50E-06	0.0050268	0.0022316	0.0013602	0.0015212	0.0066566	0.0448728
24.2446	0.0008422	0.0017709	0.0247377	0.000166	7.07E-07	0.005466	0.0023937	0.0013553	0.0015155	0.0066297	0.0448778
30	0.0006941	0.0014766	0.0248255	8.28E-05	8.78E-08	0.0059149	0.0024767	0.0013503	0.0015098	0.0066025	0.0449334
31.6228	0.0006572	0.0014029	0.0248432	6.81E-05	4.87E-08	0.0060418	0.0024914	0.0013489	0.0015082	0.0065949	0.0449565
41.2463	0.0004756	0.0010352	0.0248951	2.12E-05	1.49E-09	0.0067951	0.0025381	0.0013408	0.0014988	0.0065497	0.0451495
53.7984	0.0003119	0.0006964	0.0248562	4.65E-06	1.57E-11	0.0077778	0.0025546	0.0013305	0.0014867	0.0064913	0.04551
70.1704	0.0001799	0.0004152	0.0246856	6.40E-07	4.14E-14	0.009054	0.0025585	0.0013176	0.0014712	0.0064158	0.0460985
91.5247	8.78E-05	0.0002116	0.0243449	4.83E-08	1.80E-17	0.0107011	0.0025591	0.0013015	0.0014513	0.0063187	0.046976
100	6.60E-05	0.0001619	0.0241882	1.73E-08	8.32E-19	0.0113479	0.0025591	0.0012954	0.0014435	0.0062806	0.0473426
119.378	3.44E-05	8.78E-05	0.023805	1.66E-09	7.39E-22	0.0128101	0.0025591	0.001282	0.0014259	0.0061943	0.0481985
155.707	1.02E-05	2.79E-05	0.0230464	2.04E-11	1.40E-27	0.0154853	0.002559	0.0012586	0.0013935	0.0060356	0.0498165
203.092	2.07E-06	6.24E-06	0.0220535	6.58E-14	0	0.018842	0.002559	0.0012318	0.0013523	0.0058348	0.0518817
264.897	2.59E-07	8.86E-07	0.0208069	3.70E-17	0	0.0229993	0.0025589	0.0012025	0.0013004	0.0055829	0.054452
300	7.95E-08	2.92E-07	0.0201287	5.28E-19	0	0.0252535	0.0025588	0.0011885	0.0012718	0.0054447	0.0558464

Table F-2-9. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Utility Worker via Soil Exposures at SLDS Property DT-10 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]										
	Ac-227	**Pb-210**	**Ra-226**	**Ra-228**	**Th-228**	**Th-230**	**Th-232**	**U-234**	**U-235**	**U-238**	**Total**
345.511	1.72E-08	6.95E-08	0.0192819	2.14E-21	0	0.0280653	0.0025587	0.001173	0.0012357	0.0052706	0.0575853
450.657	5.03E-10	2.51E-09	0.017459	6.34E-27	0	0.0341111	0.0025586	0.0011478	0.0011559	0.0048894	0.0613218
587.802	5.01E-12	3.30E-11	0.0153378	0	0	0.0411329	0.0025584	0.0011341	0.0010595	0.0044333	0.0656559
766.682	1.23E-14	1.16E-13	0.0129534	0	0	0.0490034	0.0025581	0.001142	0.0009454	0.0039018	0.0705041
100	4.82E-18	7.33E-17	0.0103914	0	0	0.0574232	0.0025577	0.0011846	0.0008146	0.0033032	0.0756747
Maximum [c]	0.001902	0.003808	0.0248951	0.0015064	0.004652	0.0574232	0.0025591	0.001377	0.001541	0.006746	**0.0756747**

[a] Plot data correspond with Radiological Dose versus Time (Years) plots generated.during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of doses.

[c] Maximum values are the maximum single radionuclide doses, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

ATTACHMENT F-3

METALS RISK ASSESSMENT CALCULATIONS FOR THE ST. LOUIS DOWNTOWN SITE: PLANT 2 AND DT-10 INDUSTRIAL/CONSTRUCTION WORKER AND UTILITY WORKER SCENARIOS (On CD-ROM on the Back Cover of this Report)

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LIST OF TABLES

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Table F-3-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Accessible Soil at SLDS Plant 2

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)			
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney
Industrial/Construction Worker										
7440-38-2	Arsenic	16.6	2E-02	6E-03	3E-02	5E-02	5E-02	NA	5E-02	NA
7440-43-9	Cadmium	4.6	2E-03	6E-04	1E-02	1E-02	NA	1E-02	NA	1E-02
		Total HIs:	3E-02	7E-03	4E-02	7E-02	5E-02	1E-02	5E-02	1E-02
Utility Worker										
7440-38-2	Arsenic	16.6	9E-03	6E-04	1E-03	1E-02	1E-02	NA	1E-02	NA
7440-43-9	Cadmium	4.6	7E-04	6E-05	4E-04	1E-03	NA	1E-03	NA	1E-03
		Total HIs:	1E-02	7E-04	1E-03	1E-02	1E-02	1E-03	1E-02	1E-03

NA - For the inhalation route, HQ was not calculated because of no available toxicity criterion. For target organ HIs, exposures to the corresponding COC does not impact the designated organ.

Table F-3-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Accessible Soil at SLDS Plant 2

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial/Construction Worker						
7440-38-2	Arsenic	16.6	4E-06	9E-07	6E-07	5E-06
7440-43-9	Cadmium	4.6	NA	NA	7E-08	7E-08
		Total CRs:	4E-06	9E-07	6E-07	5E-06
Utility Worker						
7440-38-2	Arsenic	16.6	6E-08	4E-09	9E-10	6E-08
7440-43-9	Cadmium	4.6	NA	NA	1E-10	1E-10
		Total CRs:	6E-08	4E-09	1E-09	6E-08

NA - For the ingestion and dermal routes, the CR was not calculated because no toxicity criterion is available.

Table F-3-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Incidental Soil Ingestion at SLDS Plant 2

	Equation:	**(**	**EPC**	**x**	**IR_s**	**x**	**FI**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x (1 /**	**RfD_o**	**)) / (**	**BW**	**x**	**AT_{nc}**	**) =**	**HQ_{ing}**
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**		**kg**		**days**		**unitless**
CAS No.	**COC**																				
Industrial/Construction Worker																					
7440-38-2	Arsenic	(	1.66E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	2E-02
7440-43-9	Cadmium	(	4.55E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-02
																				Total HI_{ing} =	3E-02
Utility Worker																					
7440-38-2	Arsenic	(	1.66E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-03
7440-43-9	Cadmium	(	4.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	7E-04
																				Total HI_{ing} =	1E-02

IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion

Table F-3-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Incidental Soil Ingestion at SLDS Plant 2

Equation:		(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Industrial/Construction Worker																				
7440-38-2	Arsenic	(1.66E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-06
7440-43-9	Cadmium	(4.55E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	4E-06
Utility Worker																				
7440-38-2	Arsenic	(1.66E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-08
7440-43-9	Cadmium	(4.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-08

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR not calculated because of no available RG and/or toxicity criterion

Table F-3-5. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Dermal Contact with SLDS Plant 2

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																						
Industrial/Construction Worker																							
7440-38-2	Arsenic	(	1.66E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	6E-03
7440-43-9	Cadmium	(	4.55E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	6E-04
																						Total HI_{derm} =	7E-03
Utility Worker																							
7440-38-2	Arsenic	(	1.66E+01	x	3.47E+03	x	3.00E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-43-9	Cadmium	(	4.55E+00	x	3.47E+03	x	3.00E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.50E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-05
																						Total HI_{derm} =	7E-04

SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil

Table F-3-6. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Dermal Contact with Soil at SLDS Plant 2

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																						
Industrial/Construction Worker																							
7440-38-2	Arsenic	(	1.66E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7440-43-9	Cadmium	(	4.55E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	9E-07
Utility Worker																							
7440-38-2	Arsenic	(	1.66E+01	x	3.47E+03	x	3.00E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-09
7440-43-9	Cadmium	(	4.55E+00	x	3.47E+03	x	3.00E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	4E-09

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR not calculated because of no available dermal absorption fraction and/or toxicity criterion

Table F-3-7. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Inhalation of Dusts at SLDS Plant 2

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
Units:		**mg/kg**			**m^3/kg**		**hours/day**		**days/year**		**years**			**mg/m^3**		**hours**		**unitless**
CAS No.	**COC**																	
Industrial/Construction Worker																		
7440-38-2	Arsenic	(1.66E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	1.50E-05	)) /	2.19E+05	=	3E-02
7440-43-9	Cadmium	(4.55E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	1.00E-05	)) /	2.19E+05	=	1E-02
																Total HI_{inh} =		4E-02
Utility Worker																		
7440-38-2	Arsenic	(1.66E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 /	1.50E-05	)) /	8.76E+03	=	1E-03
7440-43-9	Cadmium	(4.55E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 /	1.00E-05	)) /	8.76E+03	=	4E-04
																Total HI_{inh} =		1E-03

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ not calculated because of no available toxicity criterion

Table F-3-8. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Inhalation of Dusts at SLDS Plant 2

	Equation:	**(EPC**	**x CF**	**(1 / PEF**	**) x ET**	**x EF**	**x ED**	**x IUR**	**)) / AT_c**	**= CR_{inh}**
	Units:	**mg/kg**	**μg/mg**	**m^3/kg**	**hours/day**	**days/year**	**years**	**$(\mu g/m^3)^{-1}$**	**hours**	**unitless**
CAS No.	**COC**									
Industrial/Construction Worker										
7440-38-2	Arsenic	(1.66E+01	x 1.00E+03	x (1 / 1.00E+07	) x 8.00E+00	x 2.50E+02	x 2.50E+01	x 4.30E-03	)) / 6.13E+05	= 6E-07
7440-43-9	Cadmium	(4.55E+00	x 1.00E+03	x (1 / 1.00E+07	) x 8.00E+00	x 2.50E+02	x 2.50E+01	x 1.80E-03	)) / 6.13E+05	= 7E-08
									Total CR_{inh} =	6E-07
Utility Worker										
7440-38-2	Arsenic	(1.66E+01	x 1.00E+03	x (1 / 1.00E+07	) x 8.00E+00	x 1.00E+01	x 1.00E+00	x 4.30E-03	)) / 6.13E+05	= 9E-10
7440-43-9	Cadmium	(4.55E+00	x 1.00E+03	x (1 / 1.00E+07	) x 8.00E+00	x 1.00E+01	x 1.00E+00	x 1.80E-03	)) / 6.13E+05	= 1E-10
									Total CR_{inh} =	1E-09

CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation

Table F-3-9. Soil EPCs for Metal COCs at SLDS Plant 2

CAS No.	COC	EPC (mg/kg)	EPC Basis
7440-38-2	Arsenic	1.66E+01	All surface soil data
7440-43-9	Cadmium	4.55E+00	All surface soil data

Table F-3-10. Deep Soil EPCs for Metal COCs at SLDS Plant 2

CAS No.	COC	EPC (mg/kg)	EPC Basis
7440-38-2	Arsenic	NA	No deep soil data available
7440-43-9	Cadmium	NA	No deep soil data available

Table F-3-11. Toxicity Criteria Lookup Table

CAS No.	COCs	Carcinogenic Effects[a]			Noncarcinogenic Effects[a,b]			GIABS[c] (unitless)	ABS[c] (unitless)
		Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Dermal Slope Factor[c] $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	RfD_o (mg/kg-day)	Dermal RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)		
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	1	0.03
7440-43-9	Cadmium	---	---	1.80E-03	1.00E-03	2.50E-05	1.00E-05	0.025	0.001

"---" Indicates no toxicity value is available

[a] All toxicity criteria presented represent the most current data available from the USEPA.

[b] No information was provided in the SLDS FS that stated if chronic or subchronic RfDs were used for deriving soil RGs for the industrial/construction worker, so it is assumed that chronic values were used. Therefore, only chronic values are provided for current RfDs and RfCs for determining health protectiveness of the soil RGs for metals.

[c] Current ABS and GIABS values were obtained from RAIS (ORNL 2015) and RSL Tables (USEPA 2015a).

Table F-3-12. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Accessible Soil at SLDS DT-10

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)			
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney
Industrial/Construction Worker										
7440-38-2	Arsenic	46.7	7E-02	2E-02	7E-02	2E-01	2E-01	NA	2E-01	NA
7440-43-9	Cadmium	1.4	6E-04	2E-04	3E-03	4E-03	NA	4E-03	NA	4E-03
		Total HIs:	7E-02	2E-02	7E-02	2E-01	2E-01	4E-03	2E-01	4E-03
Utility Worker										
7440-38-2	Arsenic	46.7	3E-02	2E-03	3E-03	3E-02	3E-02	NA	3E-02	NA
7440-43-9	Cadmium	1.4	2E-04	2E-05	1E-04	4E-04	NA	4E-04	NA	4E-04
		Total HIs:	3E-02	2E-03	3E-03	3E-02	3E-02	4E-04	3E-02	4E-04

NA - For the inhalation route, HQ was not calculated because of no available toxicity criterion. For target organ HIs, exposures to the corresponding COC does not impact the designated organ.

Table F-3-13. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Accessible Soil at SLDS DT-10

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial/Construction Worker						
7440-38-2	Arsenic	46.7	1E-05	3E-06	2E-06	2E-05
7440-43-9	Cadmium	1.4	NA	NA	2E-08	2E-08
	Total CRs:		1E-05	3E-06	2E-06	2E-05
Utility Worker						
7440-38-2	Arsenic	46.7	2E-07	1E-08	3E-09	2E-07
7440-43-9	Cadmium	1.4	NA	NA	3E-11	3E-11
	Total CRs:		2E-07	1E-08	3E-09	2E-07

NA - For the ingestion and dermal routes, the CR was not calculated because no toxicity criterion is available.

Table F-3-14. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Incidental Soil Ingestion at SLDS DT-10

	Equation:	**(**	**EPC**	**x**	**IR_s**	**x**	**FI**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x (1 /**	**RfD_o**	**)) / (**	**BW**	**x**	**AT_{nc}**	**) =**	**HQ_{ing}**
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**		**kg**		**days**		**unitless**
CAS No.	**COC**																			
Industrial/Construction Worker																				
7440-38-2	Arsenic	(	4.67E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	7E-02
7440-43-9	Cadmium	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	6E-04
																			Total HI_{ing} =		7E-02
Utility Worker																				
7440-38-2	Arsenic	(	4.67E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-02
7440-43-9	Cadmium	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
																			Total HI_{ing} =		3E-02

IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion

Table F-3-15. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Incidental Soil Ingestion at SLDS DT-10

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																				
Industrial/Construction Worker																					
7440-38-2	Arsenic	(	4.67E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-05
7440-43-9	Cadmium	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	1E-05
Utility Worker																					
7440-38-2	Arsenic	(	4.67E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-07
7440-43-9	Cadmium	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	2E-07

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - HQ not calculated because of no available dermal absorption fraction

Table F-3-16. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Dermal Contact with Soil at SLDS DT-10

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																						
Industrial/Construction Worker																							
7440-38-2	Arsenic	(	4.67E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	2E-02
7440-43-9	Cadmium	(	1.40E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	2E-04
																					Total HI_{derm} =		2E-02
Utility Worker																							
7440-38-2	Arsenic	(	4.67E+01	x	3.47E+03	x	3.00E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-43-9	Cadmium	(	1.40E+00	x	3.47E+03	x	3.00E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.50E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-05
																					Total HI_{derm} =		2E-03

SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil

Table F-3-17. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Dermal Contact with Soil at SLDS DT-10

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Industrial/Construction Worker																						
7440-38-2	Arsenic	(4.67E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-06
7440-43-9	Cadmium	(1.40E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	3E-06
Utility Worker																						
7440-38-2	Arsenic	(4.67E+01	x	3.47E+03	x	3.00E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-08
7440-43-9	Cadmium	(1.40E+00	x	3.47E+03	x	3.00E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	1E-08

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR not calculated because of no available dermal absorption fraction and/or toxicity criterion

Table F-3-18. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Accessible Soil: Inhalation of Dusts at SLDS DT-10

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}											
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours	unitless
CAS No.	COC												
Industrial/Construction Worker													
7440-38-2	Arsenic	(4.67E+01	x (1 /	1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05)) /	2.19E+05 =	7E-02
7440-43-9	Cadmium	(1.40E+00	x (1 /	1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05)) /	2.19E+05 =	3E-03
													Total HI_{inh} =	7E-02
Utility Worker													
7440-38-2	Arsenic	(4.67E+01	x (1 /	1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05)) /	8.76E+03 =	3E-03
7440-43-9	Cadmium	(1.40E+00	x (1 /	1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-05)) /	8.76E+03 =	1E-04
													Total HI_{inh} =	3E-03

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
RfC - Inhalation reference concentration
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ not calculated because of no available toxicity criterion

Table F-3-19. Calculations of Cancer Risks Associated with Metal COC Concentrations in Accessible Soil: Inhalation of Dusts at SLDS DT-10

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(\mu g/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Industrial/Construction Worker																								
7440-38-2	Arsenic	(	4.67E+01	x	1.00E+03	x (	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)	)	/	6.13E+05	=	2E-06
7440-43-9	Cadmium	(	1.40E+00	x	1.00E+03	x (	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)	)	/	6.13E+05	=	2E-08
																						Total CR_{inh}	**=**	2E-06
Utility Worker																								
7440-38-2	Arsenic	(	4.67E+01	x	1.00E+03	x (	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	3E-09
7440-43-9	Cadmium	(	1.40E+00	x	1.00E+03	x (	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	3E-11
																						Total CR_{inh}	**=**	3E-09

CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation

Table F-3-20. Soil EPCs for Metal COCs at SLDS DT-10

CAS No.	COC	EPC (mg/kg)	EPC Basis
7440-38-2	Arsenic	4.67E+01	All surface soil data
7440-43-9	Cadmium	1.40E+00	All surface soil data

Table F-3-21. Deep Soil EPCs for Metal COCs at DT-10

CAS No.	COC	EPC (mg/kg)	EPC Basis
7440-38-2	Arsenic	NA	No deep soil data available
7440-43-9	Cadmium	NA	No deep soil data available

Table F-3-22. Toxicity Criteria Lookup Table

CAS No.	COCs	Carcinogenic Effects[a]			Noncarcinogenic Effects[a,b]			GIABS[c] (unitless)	ABS[c] (unitless)
		Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Dermal Slope Factor[c] $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)		
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	1	0.03
7440-43-9	Cadmium	---	---	1.80E-03	1.00E-03	2.50E-05	1.00E-05	0.025	0.001

"---" Indicates no toxicity value is available

[a] All toxicity criteria presented represent the most current data available from the USEPA.

[b] No information was provided in the SLDS FS that stated if chronic or subchronic RfDs were used for deriving soil RGs for the industrial/construction worker, so it is assumed that chronic values were used. Therefore, only chronic values are provided for current RfDs and RfCs for determining health protectiveness of the soil RGs for metals.

[c] Current ABS and GIABS values were obtained from RAIS (ORNL 2015) and RSL Tables (USEPA 2015a).

ATTACHMENT F-4

COMPARISONS OF RADIOLOGICAL CANCER RISKS AND DOSES OBTAINED FOR NORTH ST. LOUIS COUNTY SITE VP-53 USING POST-REMEDIAL ACTION REPORT/FINAL STATUS SURVEY EVALUATION VERSUS THOSE OBTAINED USING UPDATED 2014 SLOPE FACTORS AND DOSE CONVERSION FACTORS

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LIST OF TABLES

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Table F-4-1. Radiological Cancer Risk and Dose Comparisons Between PRAR-FSSE Report and Third Five-Year Review Report Evaluations Conducted for North St. Louis County Site VP-53

Site	Property	Receptor	PRAR-FSSE Report Results[a]		Third Five-Year Review Report Results[b]	
			Risk (Unitless)	Dose (mrem/yr)	Risk (Unitless)	Dose (mrem/yr)
North County (Latty Avenue)	VP-53	Resident Non-Gardener (Ground Cover Absent)	4E-05	5	4E-05	4

[a] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the associateed PRAR-FSSE report [USACE 2011f]). The following RESRAD model version and CSF and DCF libraries were used in the PRAR-FSSE report for VP-53: RESRAD Version 6.5, 2001 HEAST risk library, FGR-11, and FGR-12 dose library.

[b] Risks and doses presented represent the maximum total values estimated over a 1,000-year period of evaluation (see the supporting RESRAD plot data presented in Tables F-4-2 and F-4-3). The third five-year review of VP-53 radiological risk and dose utilized RESRAD Version 7.0, with the DCFPAK 3.02 risk and dose library (adult), which incorporates the 2014 USEPA cancer slope factor and ICRP-107 DCF updates, respectively.

Table F-4-2. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Hypothetical Resident via Soil Exposures at the North St. Louis County Site VP-53 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]									
	Ac-227	Pa-231	Pb-210	Ra-226	Th-228	Th-230	U-234	U-235	U-238	Total
0	6.29E-06	1.02E-06	5.77E-08	2.38E-05	3.94E-06	1.24E-06	1.74E-09	4.26E-08	3.96E-07	3.68E-05
1	5.77E-06	1.04E-06	5.53E-08	2.35E-05	2.74E-06	1.30E-06	1.70E-09	4.17E-08	3.88E-07	3.48E-05
1.30432	5.62E-06	1.04E-06	5.46E-08	2.33E-05	2.45E-06	1.32E-06	1.69E-09	4.14E-08	3.85E-07	3.43E-05
1.70125	5.43E-06	1.05E-06	5.37E-08	2.32E-05	2.12E-06	1.34E-06	1.68E-09	4.10E-08	3.82E-07	3.36E-05
2.21898	5.19E-06	1.06E-06	5.25E-08	2.30E-05	1.76E-06	1.37E-06	1.66E-09	4.06E-08	3.77E-07	3.29E-05
2.89427	4.89E-06	1.07E-06	5.10E-08	2.28E-05	1.38E-06	1.40E-06	1.63E-09	4.00E-08	3.72E-07	3.20E-05
3	4.85E-06	1.07E-06	5.08E-08	2.27E-05	1.33E-06	1.41E-06	1.63E-09	3.99E-08	3.71E-07	3.19E-05
3.77505	4.53E-06	1.08E-06	4.92E-08	2.25E-05	1.00E-06	1.45E-06	1.60E-09	3.92E-08	3.65E-07	3.10E-05
4.92388	4.10E-06	1.08E-06	4.68E-08	2.21E-05	6.60E-07	1.51E-06	1.56E-09	3.82E-08	3.55E-07	2.99E-05
6.42232	3.60E-06	1.09E-06	4.39E-08	2.16E-05	3.83E-07	1.59E-06	1.51E-09	3.70E-08	3.44E-07	2.87E-05
8.37678	3.04E-06	1.09E-06	4.05E-08	2.09E-05	1.89E-07	1.69E-06	1.45E-09	3.54E-08	3.29E-07	2.73E-05
10	2.64E-06	1.08E-06	3.78E-08	2.04E-05	1.05E-07	1.77E-06	1.40E-09	3.42E-08	3.18E-07	2.64E-05
10.926	2.44E-06	1.08E-06	3.63E-08	2.01E-05	7.49E-08	1.82E-06	1.37E-09	3.35E-08	3.11E-07	2.59E-05
14.251	1.83E-06	1.05E-06	3.16E-08	1.91E-05	2.24E-08	1.98E-06	1.27E-09	3.11E-08	2.89E-07	2.43E-05
18.5879	1.25E-06	1.00E-06	2.63E-08	1.78E-05	4.65E-09	2.17E-06	1.16E-09	2.83E-08	2.63E-07	2.26E-05
24.2446	7.67E-07	9.22E-07	2.07E-08	1.63E-05	5.98E-10	2.40E-06	1.02E-09	2.49E-08	2.32E-07	2.07E-05
30	4.65E-07	8.35E-07	1.62E-08	1.49E-05	7.42E-11	2.62E-06	9.00E-10	2.20E-08	2.04E-07	1.91E-05
31.6228	4.04E-07	8.10E-07	1.51E-08	1.45E-05	4.12E-11	2.67E-06	8.68E-10	2.12E-08	1.97E-07	1.86E-05
41.2463	1.75E-07	6.72E-07	1.01E-08	1.25E-05	1.26E-12	2.99E-06	7.04E-10	1.71E-08	1.59E-07	1.65E-05
53.7984	5.90E-08	5.17E-07	5.92E-09	1.02E-05	1.32E-14	3.33E-06	5.36E-10	1.30E-08	1.20E-07	1.42E-05
70.1704	1.42E-08	3.63E-07	2.96E-09	7.83E-06	3.50E-17	3.68E-06	3.78E-10	9.04E-09	8.39E-08	1.20E-05
91.5247	2.23E-09	2.27E-07	1.20E-09	5.54E-06	1.52E-20	4.01E-06	2.41E-10	5.64E-09	5.23E-08	9.85E-06
100	1.07E-09	1.88E-07	8.38E-10	4.83E-06	7.01E-22	4.12E-06	2.03E-10	4.68E-09	4.33E-08	9.19E-06
119.378	1.99E-10	1.23E-07	3.69E-10	3.53E-06	6.22E-25	4.31E-06	1.38E-10	3.05E-09	2.82E-08	7.99E-06
155.707	8.48E-12	5.48E-08	7.94E-11	1.96E-06	0	4.53E-06	7.17E-11	1.37E-09	1.26E-08	6.56E-06
203.092	1.39E-13	1.92E-08	1.07E-11	9.05E-07	0	4.68E-06	3.72E-11	4.80E-10	4.42E-09	5.61E-06
264.897	6.49E-16	4.88E-09	7.82E-13	3.31E-07	0	4.75E-06	2.37E-11	1.22E-10	1.13E-09	5.09E-06
300	3.08E-17	2.24E-09	1.77E-13	1.87E-07	0	4.77E-06	2.13E-11	5.64E-11	5.18E-10	4.95E-06
345.511	5.93E-19	8.18E-10	2.58E-14	8.91E-08	0	4.77E-06	2.00E-11	2.06E-11	1.89E-10	4.86E-06
450.657	6.44E-23	7.96E-11	3.02E-16	1.61E-08	0	4.76E-06	1.93E-11	2.02E-12	1.85E-11	4.77E-06

Table F-4-2. Summary of RESRAD 7.0 Plot Data for Radiological Cancer Risk to a Hypothetical Resident via Soil Exposures at the North St. Louis County Site VP-53 (Ground Cover Absent)

Years[a]	Radiological Cancer Risk[b]									
	Ac-227	**Pa-231**	**Pb-210**	**Ra-226**	**Th-228**	**Th-230**	**U-234**	**U-235**	**U-238**	**Total**
587.802	4.14E-28	3.82E-12	9.12E-19	1.72E-09	0	4.72E-06	1.91E-11	9.77E-14	9.36E-13	4.73E-06
766.682	0	7.25E-14	4.71E-22	9.36E-11	0	4.68E-06	1.89E-11	1.88E-15	6.75E-14	4.68E-06
1,000	0	4.12E-16	2.43E-26	2.09E-12	0	4.61E-06	1.86E-11	1.08E-17	5.01E-14	4.61E-06
Maximum[c]	0.000006291	1.09023E-06	5.767E-08	0.00002381	0.000003937	4.76917E-06	1.739E-09	4.262E-08	3.964E-07	**3.68E-05**

[a] Plot data correspond with Cancer Risk versus Time (Years) plots generated during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of cancer risks.

[c] Maximum values are the maximum single radionuclide cancer risks, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

Table F-4-3. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident via Soil Exposures at the North St. Louis County Site VP-53 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]									
	Ac-227	Pa-231	Pb-210	Ra-226	Th-228	Th-230	U-234	U-235	U-238	Total
0	0.753600	0.034710	0.006779	1.22900	1.48800	0.07718	0.000139	0.002462	0.024510	3.61600
1	0.690926	0.0391455	0.0064978	1.21205	1.03516	0.0801203	0.0001359	0.0024083	0.0239702	3.09041
1.30432	0.672913	0.0403875	0.0064147	1.20681	0.926994	0.0810073	0.0001349	0.0023922	0.0238093	2.96086
1.70125	0.650122	0.0419361	0.0063079	1.20001	0.802717	0.0821585	0.0001338	0.0023713	0.023601	2.80936
2.21898	0.621551	0.0438393	0.0061712	1.19118	0.665309	0.0836503	0.0001322	0.0023443	0.0233321	2.63751
2.89427	0.586164	0.0461327	0.0059974	1.17973	0.520799	0.0855794	0.0001303	0.0023095	0.0229859	2.44983
3	0.580809	0.0464732	0.0059706	1.17795	0.501208	0.0858798	0.00013	0.0023042	0.0229322	2.42366
3.77505	0.543018	0.0488229	0.005778	1.16493	0.3784	0.0880676	0.0001278	0.002265	0.0225421	2.25395
4.92388	0.491478	0.0518614	0.0055039	1.14582	0.24947	0.0912659	0.0001246	0.0022082	0.0219761	2.05971
6.42232	0.431533	0.0551093	0.0051657	1.12125	0.144885	0.0953583	0.0001205	0.0021363	0.0212592	1.87682
8.37678	0.364194	0.0582957	0.0047558	1.08982	0.0713194	0.100564	0.0001154	0.002046	0.0203591	1.71147
10	0.316328	0.0601766	0.0044401	1.06424	0.0395877	0.104775	0.0001114	0.0019739	0.0196406	1.61127
10.926	0.291896	0.0609819	0.0042695	1.04987	0.0282956	0.107132	0.0001091	0.0019339	0.0192421	1.56373
14.251	0.218715	0.062556	0.0037092	0.999523	0.0084732	0.115337	0.0001014	0.0017969	0.0178768	1.42809
18.5879	0.1501	0.0622943	0.0030874	0.936866	0.001758	0.125444	9.22E-05	0.0016327	0.0162405	1.29752
24.2446	0.09186	0.0595236	0.0024302	0.860171	0.000226	0.13767	8.14E-05	0.0014409	0.0143292	1.16773
30	0.0557382	0.0552272	0.001905	0.787814	2.80E-05	0.149073	7.17E-05	0.0012689	0.0126152	1.06374
31.6228	0.0484144	0.0538802	0.0017786	0.768416	1.56E-05	0.152109	6.92E-05	0.0012242	0.0121701	1.03808
41.2463	0.0209979	0.0455762	0.0011837	0.662003	4.75E-07	0.168626	5.61E-05	0.0009898	0.0098352	0.909268
53.7984	0.0070627	0.0355084	0.000696	0.543665	5.01E-09	0.186737	4.26E-05	0.0007502	0.0074493	0.781911
70.1704	0.0017051	0.0250692	0.0003481	0.419235	1.32E-11	0.205524	2.99E-05	0.0005226	0.0051848	0.657619
91.5247	0.0002671	0.0157108	0.000141	0.297709	5.73E-15	0.223634	1.90E-05	0.0003261	0.0032318	0.541039
100	0.000128	0.0130323	9.85E-05	0.25971	2.65E-16	0.229246	1.59E-05	0.0002704	0.002679	0.50518
119.378	2.38E-05	0.0084909	4.34E-05	0.189883	2.35E-19	0.239487	1.07E-05	0.0001763	0.0017446	0.43986
155.707	1.02E-06	0.0037984	9.33E-06	0.10534	4.46E-25	0.2517	5.33E-06	7.90E-05	0.0007806	0.361714
203.092	1.66E-08	0.0013297	1.26E-06	0.0487582	0	0.259597	2.54E-06	2.78E-05	0.0002735	0.30999
264.897	7.77E-11	0.0003382	9.20E-08	0.0178351	0	0.263503	1.44E-06	7.09E-06	6.96E-05	0.281755
300	3.69E-12	0.0001554	2.08E-08	0.0100725	0	0.26426	1.23E-06	3.26E-06	3.20E-05	0.274524
345.511	7.10E-14	5.67E-05	3.04E-09	0.0048018	0	0.264524	1.13E-06	1.19E-06	1.17E-05	0.269396
450.657	7.72E-18	5.52E-06	3.55E-11	0.000867	0	0.263886	1.07E-06	1.17E-07	1.14E-06	0.264761
587.802	5.21E-23	2.65E-07	1.07E-13	9.29E-05	0	0.262356	1.06E-06	5.67E-09	5.75E-08	0.26245

Table F-4-3. Summary of RESRAD 7.0 Plot Data for Radiological Dose to a Hypothetical Resident via Soil Exposures at the North St. Louis County Site VP-53 (Ground Cover Absent)

Years[a]	Radiological Dose (mrem/yr)[b]									
	Ac-227	**Pa-231**	**Pb-210**	**Ra-226**	**Th-228**	**Th-230**	**U-234**	**U-235**	**U-238**	**Total**
766.682	8.39E-30	5.03E-09	5.54E-17	5.05E-06	0	0.26013	1.05E-06	1.09E-10	3.86E-09	0.260136
1,000	0	2.86E-11	2.86E-21	1.13E-07	0	0.257031	1.04E-06	6.29E-13	2.79E-09	0.257032
Maximum [c]	0.753600	0.062556	0.006779	1.22900	1.48800	0.264524	0.0001389	0.002462	0.024510	**3.61600**

[a] Plot data correspond with Radiological Dose versus Time (Years) plots generated.during the RESRAD Version 7.0 modeling run.

[b] Radiological COCs presented are parent radionuclides. Contributions from the ingrowth of radiological daughters, over a 1,000-year evaluation period, are included in the RESRAD Version 7.0 calculations of doses.

[c] Maximum values are the maximum single radionuclide doses, including contributions from daughter ingrowth, modeled to occur over a 1,000-year evaluation period.

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ATTACHMENT F-5

METALS RISK ASSESSMENT CALCULATIONS FOR LATTY AVENUE PROPERTIES: HAZELWOOD INTERIM STORAGE SITE, VP-01(L) AND PARCEL 10K530087, AND VP-02(L) WORKER, RECREATIONAL USER/TRESPASSER, AND RESIDENTIAL SCENARIOS

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Table F-5-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Construction Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	9.1	9E-02	NA	NA	9E-02	9E-02	9E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	15	2E-01	1E-02	2E-02	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	2.8	2E-01	NA	NA	2E-01	NA	NA	2E-01	NA	NA	NA	2E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	5E-01	1E-02	2E-02	6E-01	3E-01	9E-02	5E-01	NA	NA	NA	2E-01

Table F-5-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	9.1	4E-03	NA	NA	4E-03	4E-03	4E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	15	8E-03	5E-04	9E-04	1E-02	1E-02	NA	1E-02	NA	NA	NA	NA
7440-28-0	Thallium	2.8	9E-03	NA	NA	9E-03	NA	NA	9E-03	NA	NA	NA	9E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-02	5E-04	9E-04	2E-02	1E-02	4E-03	2E-02	NA	NA	NA	9E-03
Road Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F-5-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	9.1	3E-02	NA	NA	3E-02	3E-02	3E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	15	7E-02	4E-03	8E-03	9E-02	9E-02	NA	9E-02	NA	NA	NA	NA
7440-28-0	Thallium	2.8	8E-02	NA	NA	8E-02	NA	NA	8E-02	NA	NA	NA	8E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-01	4E-03	8E-03	2E-01	1E-01	3E-02	2E-01	NA	NA	NA	8E-02
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	9.1	1.0E-03	NA	NA	1E-03	1E-03	1E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	15	2.2E-03	7E-04	2E-03	5E-03	5E-03	NA	5E-03	NA	NA	NA	NA
7440-28-0	Thallium	2.8	2.5E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	5.7E-03	7E-04	2E-03	9E-03	6E-03	1E-03	8E-03	NA	NA	NA	2E-03

Table F-5-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Resident (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Resident (Subsurface Soil)													
7440-36-0	Antimony	9.1	9E-02	NA	NA	9E-02	9E-02	9E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	15	2E-01	2E-02	3E-08	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	2.8	5E-01	NA	NA	5E-01	NA	NA	5E-01	NA	NA	NA	5E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	8E-01	2E-02	3E-08	8E-01	3E-01	9E-02	8E-01	NA	NA	NA	5E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Table F-5-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Construction Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	9.1	NA	NA	NA	NA
7440-38-2	Arsenic	15	1E-06	8E-08	2E-08	1E-06
7440-28-0	Thallium	2.8	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	1E-06	8E-08	2E-08	1E-06

Table F-5-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	9.1	NA	NA	NA	NA
7440-38-2	Arsenic	15	5E-08	3E-09	8E-10	6E-08
7440-28-0	Thallium	2.8	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	5E-08	3E-09	8E-10	6E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-5-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	9.1	NA	NA	NA	NA
7440-38-2	Arsenic	15	5E-07	3E-08	8E-09	5E-07
7440-28-0	Thallium	2.8	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	5E-07	3E-08	8E-09	5E-07
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	9.1	NA	NA	NA	NA
7440-38-2	Arsenic	15	9E-07	3E-08	1E-08	1E-06
7440-28-0	Thallium	2.8	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	9E-07	3E-08	1E-08	1E-06
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-5-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the HISS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Resident (Subsurface Soil)						
7440-36-0	Antimony	9.1	NA	NA	NA	NA
7440-38-2	Arsenic	15	3E-05	8E-09	1E-08	3E-05
7440-28-0	Thallium	2.8	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	3E-05	8E-09	1E-08	3E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Table F-5-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
																		Total HI_{ing} =		0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																		Total HI_{ing} =		0E+00
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-02
7440-38-2	Arsenic	(1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-28-0	Thallium	(2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																		Total HI_{ing} =		5E-01

Table F-5-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																		Total HI_{ing} =		0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-38-2	Arsenic	(1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-28-0	Thallium	(2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	9E-03
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																		Total HI_{ing} =		2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																		Total HI_{ing} =		0E+00

Table F-5-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Road Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-02
7440-38-2	Arsenic	1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-02
7440-28-0	Thallium	2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	8E-02
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	2E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =	0E+00
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	9.10E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-38-2	Arsenic	1.50E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-28-0	Thallium	2.80E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-61-1	Uranium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =	6E-03

Table F-5-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
																			Total HI_{ing} =	0E+00

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable

Table F-5-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	**(**	**EPC**	**x**	**IR_s**	**x**	**FI**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x**	**SF_o**	**) / (**	**BW**	**x**	**AT_c**	**) =**	**CR_{ing}**
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**$(mg/kg\text{-}day)^{-1}$**		**kg**		**days**		**unitless**
CAS No.	**COC**																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =			0E+00
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =			0E+00
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7440-28-0	Thallium	(	2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =			1E-06

Table F-5-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	**COC**																		
Utility Worker (Surface Soil)																			
7440-36-0	Antimony	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	8.00E+01	x	2.56E+04		NA
7440-39-3	Barium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-43-9	Cadmium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	8.00E+01	x	2.56E+04		NA
7439-98-7	Molydenum	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-02-0	Nickel	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7782-49-2	Selenium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-28-0	Thallium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-62-2	Vanadium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
																		Total CR_{ing} =	0E+00
Utility Worker (Subsurface Soil)																			
7440-36-0	Antimony	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-38-2	Arsenic	1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	8.00E+01	x	2.56E+04		5E-08
7440-28-0	Thallium	2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
																		Total CR_{ing} =	5E-08
Road Worker (Surface Soil)																			
7440-36-0	Antimony	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	8.00E+01	x	2.56E+04		NA
7440-39-3	Barium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-43-9	Cadmium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	8.00E+01	x	2.56E+04		NA
7439-98-7	Molydenum	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-02-0	Nickel	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7782-49-2	Selenium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-28-0	Thallium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
7440-62-2	Vanadium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04		NA
																		Total CR_{ing} =	0E+00

Table F-5-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

		Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
		Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Road Worker (Subsurface Soil)																						
7440-36-0	Antimony		(	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(	1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-07
7440-28-0	Thallium		(	2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{ing} =	5E-07
Maintenance Worker (Surface Soil)																						
7440-36-0	Antimony		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{ing} =	0E+00
Maintenance Worker (Subsurface Soil)																						
7440-36-0	Antimony		(	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(	1.50E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7440-28-0	Thallium		(	2.80E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{ing} =	9E-07

Table F-5-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																				
Recreational User/Trespasser (Surface Soil)																					
7440-36-0	Antimony	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	0E+00

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-5. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

Equation:		(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	(	1	/	RfD_o	)	)	/	AT_{nc}	=	HQ_{ing}
Units:			mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr					mg/kg-day				days		unitless
CAS No.	COC																					
Resident (Surface Soil)																						
7440-36-0	Antimony	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	4.00E-04	)	)	/	9.49E+03	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	=	NA
7440-39-3	Barium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-01	)	)	/	9.49E+03	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	1.00E-03	)	)	/	9.49E+03	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-02	)	)	/	9.49E+03	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	5.04E-03	)	)	/	9.49E+03	=	NA
																					Total HI_{ing} =	0E+00
Resident (Subsurface Soil)																						
7440-36-0	Antimony	(	9.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	4.00E-04	)	)	/	9.49E+03	=	9E-02
7440-38-2	Arsenic	(	1.50E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	=	2E-01
7440-28-0	Thallium	(	2.80E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	=	5E-01
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	=	NA
																					Total HI_{ing} =	8E-01

IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable

Table F-5-6. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the HISS

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	9.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	1.50E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	3E-05
7440-28-0	Thallium	(	2.80E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	3E-05

"---" - Value not available
IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-7. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-8. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																					Total HI_{derm} =	0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-28-0	Thallium	(2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	1E-02

Table F-5-8. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-04
7440-28-0	Thallium	(2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	5E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00

Table F-5-8. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-28-0	Thallium	(2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	4E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	0E+00
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(9.10E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(1.50E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	7E-04
7440-28-0	Thallium	(2.80E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	7E-04

Table F-5-8. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-9. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	**(**	**EPC**	**x**	**SA**	**x**	**AF**	**x**	**ABS**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x**	**SF_d**	**) / (**	**BW**	**x**	**AT_c**	**) =**	**CR_{derm}**
	Units:		**mg/kg**		**cm^2**		**mg/cm^2**		**unitless**		**kg/mg**		**days/yr**		**yr**		**$(mg/kg\text{-}day)^{-1}$**		**kg**		**days**		**unitless**
CAS No.	**COC**																						
Industrial Worker (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	0E+00
Construction Worker (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	0E+00
Construction Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	8E-08
7440-28-0	Thallium	(	2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	8E-08

Table F-5-9. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	**(**	**EPC**	**x**	**SA**	**x**	**AF**	**x**	**ABS**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x**	**SF_d**	**)**	**/**	**(**	**BW**	**x**	**AT_c**	**)**	**=**	**CR_{derm}**
	Units:		**mg/kg**		**cm^2**		**mg/cm^2**		**unitless**		**kg/mg**		**days/yr**		**yr**		**$(mg/kg\text{-}day)^{-1}$**				**kg**		**days**			**unitless**
CAS No.	**COC**																									
Utility Worker (Surface Soil)																										
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
																									Total CR_{derm} =	0E+00
Utility Worker (Subsurface Soil)																										
7440-36-0	Antimony	(	9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-38-2	Arsenic	(	1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	)	/	(	8.00E+01	x	2.56E+04	)	=	3E-09
7440-28-0	Thallium	(	2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
																									Total CR_{derm} =	3E-09
Road Worker (Surface Soil)																										
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	)	/	(	8.00E+01	x	2.56E+04	)	=	NA
																									Total CR_{derm} =	0E+00

Table F-5-9. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																						
Road Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	9.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.50E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-08
7440-28-0	Thallium	(	2.80E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		3E-08
Maintenance Worker (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		0E+00
Maintenance Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	9.10E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.50E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-08
7440-28-0	Thallium	(	2.80E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		3E-08

Table F-5-9. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil)																						
7440-36-0	Antimony	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-10. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

	Equation:	(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	(1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr			mg/kg-day		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	(1 /	2.50E-05	)) /	9.49E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	1.31E-04	)) /	9.49E+03	) =	NA
																Total HI_{derm} =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(9.10E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(1.50E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	) =	2E-02
7440-28-0	Thallium	(2.80E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	) =	NA
																Total HI_{derm} =	2E-02

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-11. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the HISS

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	9.10E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.50E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	8E-09
7440-28-0	Thallium	(	2.80E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	8E-09

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-12. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	**=**	**(**	**(**	**SA_{s-cr}**	**x**	**AF_{s-cr}**	**x**	**ED_{cr}**	**)**	**/**	**BW_c**	**)**	**+**	**(**	**(**	**SA_{s-ar}**	**x**	**AF_{s-ar}**	**x**	**ED_{ar}**	**)**	**/**	**BW_a**	**)**
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-13. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / ---))	/	2.19E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 1.50E-05))	/	2.19E+05	=	NA
7440-39-3	Barium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 5.00E-04))	/	2.19E+05	=	NA
7440-43-9	Cadmium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 1.00E-05))	/	2.19E+05	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 1.00E-04))	/	2.19E+05	=	NA
7439-98-7	Molydenum	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / ---))	/	2.19E+05	=	NA
7440-02-0	Nickel	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 9.00E-05))	/	2.19E+05	=	NA
7782-49-2	Selenium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 2.00E-02))	/	2.19E+05	=	NA
7440-28-0	Thallium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / ---))	/	2.19E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / 4.00E-05))	/	2.19E+05	=	NA
7440-62-2	Vanadium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 / ---))	/	2.19E+05	=	NA
														Total HI_{inh} =		0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.50E-05))	/	8.76E+03	=	NA
7440-39-3	Barium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 5.00E-03))	/	8.76E+03	=	NA
7440-43-9	Cadmium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7439-98-7	Molydenum	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7440-02-0	Nickel	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 2.00E-04))	/	8.76E+03	=	NA
7782-49-2	Selenium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7440-28-0	Thallium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.00E-04))	/	8.76E+03	=	NA
7440-62-2	Vanadium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---))	/	8.76E+03	=	NA
														Total HI_{inh} =		0E+00

Table F-5-13. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.50E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	2E-02
7440-28-0	Thallium	(2.80E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		2E-02
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-39-3	Barium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	NA
7440-43-9	Cadmium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	NA
7782-49-2	Selenium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.50E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	9E-04
7440-28-0	Thallium	(2.80E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		9E-04

Table F-5-13. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}																
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless		
CAS No.	**COC**																	
Road Worker (Surface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-38-2	Arsenic	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA	
7440-39-3	Barium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	NA	
7440-43-9	Cadmium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-47-3	Chromium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7439-98-7	Molydenum	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-02-0	Nickel	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	NA	
7782-49-2	Selenium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-28-0	Thallium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA	
7440-62-2	Vanadium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
															Total HI_{inh} =		0E+00	
Road Worker (Subsurface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(9.10E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-38-2	Arsenic	(1.50E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	8E-03	
7440-28-0	Thallium	(2.80E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA	
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA	
															Total HI_{inh} =		8E-03	

Table F-5-13. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}															
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless	
CAS No.	**COC**																
Maintenance Worker (Surface Soil) - Subchronic Exposures																	
7440-36-0	Antimony	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-38-2	Arsenic	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	NA	
7440-39-3	Barium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) /	5.78E+04	=	NA	
7440-43-9	Cadmium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7439-98-7	Molydenum	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-02-0	Nickel	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) /	5.78E+04	=	NA	
7782-49-2	Selenium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-28-0	Thallium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA	
7440-62-2	Vanadium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
															Total HI_{inh} =	0E+00	
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																	
7440-36-0	Antimony	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-38-2	Arsenic	(1.50E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	2E-03	
7440-28-0	Thallium	(2.80E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA	
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA	
															Total HI_{inh} =	2E-03	

Table F-5-13. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.50E-05	)) /	7.88E+04	=	NA
7440-39-3	Barium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-04	)) /	7.88E+04	=	NA
7440-43-9	Cadmium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-05	)) /	7.88E+04	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-04	)) /	7.88E+04	=	NA
7439-98-7	Molydenum	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-02-0	Nickel	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	9.00E-05	)) /	7.88E+04	=	NA
7782-49-2	Selenium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) /	7.88E+04	=	NA
7440-28-0	Thallium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-05	)) /	7.88E+04	=	NA
7440-62-2	Vanadium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
														Total HI_{inh} =		0E+00

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation not applicable

Table F-5-14. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
Units:			mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Industrial Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00
Construction Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00

Table F-5-14. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Construction Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	9.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.50E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	2E-08
7440-28-0	Thallium	(	2.80E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		2E-08
Utility Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00
Utility Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	9.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.50E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	8E-10
7440-28-0	Thallium	(	2.80E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		8E-10

Table F-5-14. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(µg/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	NA
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	NA
7782-49-2	Selenium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(9.10E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.50E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	8E-09
7440-28-0	Thallium	(2.80E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	8E-09
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	NA
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	NA
7782-49-2	Selenium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-5-14. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
Units:			mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Maintenance Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	9.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.50E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)	)	/	6.13E+05	=	1E-08
7440-28-0	Thallium	(	2.80E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	1E-08
Recreational User/Trespasser (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	0E+00

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-15. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

	Equation:	(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x RfC)) / AT_{nc} = CR_{inh}																
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		mg/m^3		hours		unitless
CAS No.	COC																			
Resident (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	2.28E+05	=	NA
7440-39-3	Barium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-43-9	Cadmium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	2.28E+05	=	NA
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	2.28E+05	=	NA
7439-98-7	Molydenum	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	2.28E+05	=	NA
7782-49-2	Selenium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-28-0	Thallium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-62-2	Vanadium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																		Total HI_{inh} =		0E+00
Resident (Subsurface Soil)																				
7440-36-0	Antimony	(9.10E+00	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(1.50E+01	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	2.28E+05	=	3E-08
7440-28-0	Thallium	(2.80E+00	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (	1 / 1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																		Total HI_{inh} =		3E-08

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-16. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the HISS

Equation:		(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x IUR)) / AT_c = CR_{inh}																				
Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		$(\mu g/m^3)^{-1}$		hours		unitless		
CAS No.	**COC**																					
Resident (Surface Soil)																						
7440-36-0	Antimony	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	NA		
7440-39-3	Barium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-43-9	Cadmium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	NA		
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	=	NA		
7439-98-7	Molydenum	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-02-0	Nickel	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	NA		
7782-49-2	Selenium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-28-0	Thallium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-62-2	Vanadium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
																				Total CR_{inh} =		0E+00
Resident (Subsurface Soil)																						
7440-36-0	Antimony	(9.10E+00	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-38-2	Arsenic	(1.50E+01	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	1E-08		
7440-28-0	Thallium	(2.80E+00	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 / 1.36E+09)	x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA		
																				Total CR_{inh} =		1E-08

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-17. Surface Soil EPCs for Metal COCs at the HISS

CAS No.	COC	Surface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	Not a COC
7440-38-2	Arsenic	Not a COC
7440-39-3	Barium	Not a COC
7440-43-9	Cadmium	Not a COC
7440-47-3	Chromium	Not a COC
7439-98-7	Molydenum	Not a COC
7440-02-0	Nickel	Not a COC
7782-49-2	Selenium	Not a COC
7440-28-0	Thallium	Not a COC
7440-61-1	Uranium	Not a COC
7440-62-2	Vanadium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c).

Table F-5-18. Subsurface Soil EPCs for Metal COCs at the HISS

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	9.1
7440-38-2	Arsenic	15
7440-28-0	Thallium	2.8
7440-61-1	Uranium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c).

Table F-5-19. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015s).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the IUR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-5-20. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	2.1	2E-03	NA	NA	2E-03	2E-03	2E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	4E-02	9E-03	4E-02	8E-02	8E-02	NA	8E-02	NA	NA	NA	NA
7440-39-3	Barium	164	3E-04	NA	7E-03	8E-03	8E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	2E-04	7E-05	1E-03	1E-03	NA	1E-03	NA	1E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	17.93	4E-04	NA	5E-03	5E-03	NA	5E-03	NA	NA	NA	5E-03	NA
7782-49-2	Selenium	0.9	8E-05	NA	1E-06	8E-05	NA	NA	8E-05	NA	NA	NA	8E-05
7440-28-0	Thallium	5	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	1E-01	9E-03	5E-02	2E-01	9E-02	1E-02	2E-01	1E-03	2E-04	5E-03	1E-01
Construction Worker (Surface Soil)													
7440-36-0	Antimony	2.1	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	3E-01	2E-02	4E-02	4E-01	4E-01	NA	4E-01	NA	NA	NA	NA
7440-39-3	Barium	164	3E-03	NA	7E-04	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	2E-03	3E-04	NA	2E-03	NA	2E-03	NA	2E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	17.93	4E-03	NA	2E-03	6E-03	NA	6E-03	NA	NA	NA	6E-03	NA
7782-49-2	Selenium	0.9	8E-04	NA	NA	8E-04	NA	NA	8E-04	NA	NA	NA	8E-04
7440-28-0	Thallium	5	4E-01	NA	NA	4E-01	NA	NA	4E-01	NA	NA	NA	4E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	8E-01	2E-02	4E-02	8E-01	4E-01	5E-02	8E-01	2E-03	2E-03	6E-03	4E-01
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	1.6	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	12	2E-01	1E-02	2E-02	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	2.5	2E-01	NA	NA	2E-01	NA	NA	2E-01	NA	NA	NA	2E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	4E-01	1E-02	2E-02	4E-01	2E-01	2E-02	4E-01	NA	NA	NA	2E-01

Table F-5-20. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	2.1	9E-04	NA	NA	9E-04	9E-04	9E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	1E-02	8E-04	2E-03	2E-02	2E-02	NA	2E-02	NA	NA	NA	NA
7440-39-3	Barium	164	1E-04	NA	3E-05	2E-04	2E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	8E-05	1E-05	NA	1E-04	NA	1E-04	NA	1E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	9E-05	NA	NA	9E-05	NA	NA	NA	NA	9E-05	NA	NA
7440-02-0	Nickel	17.93	1E-04	NA	8E-05	2E-04	NA	2E-04	NA	NA	NA	2E-04	NA
7782-49-2	Selenium	0.9	3E-05	NA	NA	3E-05	NA	NA	3E-05	NA	NA	NA	3E-05
7440-28-0	Thallium	5	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	7E-04	NA	NA	7E-04	NA	7E-04	NA	NA	NA	NA	NA
		Total HIs:	3E-02	8E-04	2E-03	3E-02	2E-02	2E-03	3E-02	1E-04	9E-05	2E-04	2E-02
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	1.6	6E-04	NA	NA	6E-04	6E-04	6E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	12	7E-03	4E-04	7E-04	8E-03	8E-03	NA	8E-03	NA	NA	NA	NA
7440-28-0	Thallium	2.5	8E-03	NA	NA	8E-03	NA	NA	8E-03	NA	NA	NA	8E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-02	4E-04	7E-04	2E-02	8E-03	6E-04	2E-02	NA	NA	NA	8E-03
Road Worker (Surface Soil)													
7440-36-0	Antimony	2.1	8E-03	NA	NA	8E-03	8E-03	8E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	1E-01	7E-03	1E-02	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-39-3	Barium	164	1E-03	NA	3E-04	1E-03	1E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	8E-04	1E-04	NA	9E-04	NA	9E-04	NA	9E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	8E-04	NA	NA	8E-04	NA	NA	NA	NA	8E-04	NA	NA
7440-02-0	Nickel	17.93	1E-03	NA	7E-04	2E-03	NA	2E-03	NA	NA	NA	2E-03	NA
7782-49-2	Selenium	0.9	3E-04	NA	NA	3E-04	NA	NA	3E-04	NA	NA	NA	3E-04
7440-28-0	Thallium	5	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	7E-03	NA	NA	7E-03	NA	7E-03	NA	NA	NA	NA	NA
		Total HIs:	3E-01	8E-03	1E-02	3E-01	2E-01	2E-02	3E-01	9E-04	8E-04	2E-03	1E-01

Table F-5-20. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	1.6	6E-03	NA	NA	6E-03	6E-03	6E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	12	6E-02	4E-03	7E-03	7E-02	7E-02	NA	7E-02	NA	NA	NA	NA
7440-28-0	Thallium	2.5	7E-02	NA	NA	7E-02	NA	NA	7E-02	NA	NA	NA	7E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	1E-01	4E-03	7E-03	1E-01	8E-02	6E-03	1E-01	NA	NA	NA	7E-02
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	2.1	2E-03	NA	NA	2E-03	2E-03	2E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	4E-02	1E-03	4E-03	4E-02	4E-02	NA	4E-02	NA	NA	NA	NA
7440-39-3	Barium	164	3E-04	NA	8E-05	4E-04	4E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	4E-04	2E-05	NA	5E-04	NA	5E-04	NA	5E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	17.93	4E-04	NA	2E-04	6E-04	NA	6E-04	NA	NA	NA	6E-04	NA
7782-49-2	Selenium	0.9	8E-05	NA	NA	8E-05	NA	NA	8E-05	NA	NA	NA	8E-05
7440-28-0	Thallium	5	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	8E-02	1E-03	4E-03	9E-02	4E-02	5E-03	8E-02	5E-04	2E-04	6E-04	4E-02
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	1.6	2E-04	NA	NA	2E-04	2E-04	2E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	12	2E-03	6E-04	2E-03	4E-03	4E-03	NA	4E-03	NA	NA	NA	NA
7440-28-0	Thallium	2.5	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	4E-03	6E-04	2E-03	7E-03	4E-03	2E-04	6E-03	NA	NA	NA	2E-03

Table F-5-20. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	2.1	4E-04	NA	NA	4E-04	4E-04	4E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	7E-03	3E-03	7E-06	1E-02	1E-02	NA	1E-02	NA	NA	NA	NA
7440-39-3	Barium	164	7E-05	NA	1E-06	7E-05	7E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	4E-05	3E-05	2E-07	7E-05	NA	7E-05	NA	7E-05	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	4E-05	NA	NA	4E-05	NA	NA	NA	NA	4E-05	NA	NA
7440-02-0	Nickel	17.93	7E-05	NA	9E-07	7E-05	NA	7E-05	NA	NA	NA	7E-05	NA
7782-49-2	Selenium	0.9	1E-05	NA	2E-10	1E-05	NA	NA	1E-05	NA	NA	NA	1E-05
7440-28-0	Thallium	5	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	4E-04	NA	NA	4E-04	NA	4E-04	NA	NA	NA	NA	NA
		Total HIs:	3E-02	3E-03	1E-05	3E-02	1E-02	9E-04	3E-02	7E-05	4E-05	7E-05	2E-02
Resident (Surface Soil)													
7440-36-0	Antimony	2.1	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	25	3E-01	3E-02	2E-10	3E-01	3E-01	NA	3E-01	NA	NA	NA	NA
7440-39-3	Barium	164	3E-03	NA	4E-08	3E-03	3E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	2E-03	2E-04	3E-12	2E-03	NA	2E-03	NA	2E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	3	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	17.93	3E-03	NA	9E-10	3E-03	NA	3E-03	NA	NA	NA	3E-03	NA
7782-49-2	Selenium	0.9	7E-04	NA	1E-08	7E-04	NA	NA	7E-04	NA	NA	NA	7E-04
7440-28-0	Thallium	5	9E-01	NA	NA	9E-01	NA	NA	9E-01	NA	NA	NA	9E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	22	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	**1E+00**	3E-02	6E-08	**1E+00**	4E-01	4E-02	**1E+00**	2E-03	2E-03	3E-03	9E-01

Table F-5-20. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Resident (Subsurface Soil)													
7440-36-0	Antimony	1.6	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	12	2E-01	1E-02	1E-10	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	2.5	5E-01	NA	NA	5E-01	NA	NA	5E-01	NA	NA	NA	5E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	6E-01	1E-02	1E-10	7E-01	2E-01	2E-02	6E-01	NA	NA	NA	5E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-21. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	6E-06	1E-06	9E-07	8E-06
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	7E-09	7E-09
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	4E-08	4E-08
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	6E-06	1E-06	9E-07	8E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	2E-06	1E-07	3E-08	2E-06
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	3E-10	3E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	2E-09	2E-09
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	2E-06	1E-07	4E-08	2E-06
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	1.6	NA	NA	NA	NA
7440-38-2	Arsenic	12	1E-06	6E-08	2E-08	1E-06
7440-28-0	Thallium	2.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	1E-06	6E-08	2E-08	1E-06

Table F-5-21. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	9E-08	5E-09	1E-09	9E-08
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	1E-11	1E-11
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	6E-11	6E-11
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	9E-08	5E-09	1E-09	9E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	1.6	NA	NA	NA	NA
7440-38-2	Arsenic	12	4E-08	3E-09	7E-10	5E-08
7440-28-0	Thallium	2.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	4E-08	3E-09	7E-10	5E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	8E-07	5E-08	1E-08	8E-07
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	1E-10	1E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	5E-10	5E-10
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	8E-07	5E-08	1E-08	8E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	1.6	NA	NA	NA	NA
7440-38-2	Arsenic	12	4E-07	2E-08	6E-09	4E-07
7440-28-0	Thallium	2.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	4E-07	2E-08	6E-09	4E-07

Table F-5-21. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	1E-06	5E-08	2E-08	2E-06
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	2E-10	2E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	1E-09	1E-09
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	1E-06	5E-08	3E-08	2E-06
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	1.6	NA	NA	NA	NA
7440-38-2	Arsenic	12	7E-07	3E-08	1E-08	8E-07
7440-28-0	Thallium	2.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	7E-07	3E-08	1E-08	8E-07
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	4E-07	2E-07	6E-11	6E-07
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	5E-13	5E-13
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	3E-12	3E-12
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	4E-07	2E-07	6E-11	6E-07

Table F-5-21. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Parcel 10K530087

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	2.1	NA	NA	NA	NA
7440-38-2	Arsenic	25	5E-05	1E-08	2E-08	5E-05
7440-39-3	Barium	164	NA	NA	NA	NA
7440-43-9	Cadmium	0.5	NA	NA	2E-10	2E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	3	NA	NA	NA	NA
7440-02-0	Nickel	17.93	NA	NA	9E-10	9E-10
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	22	NA	NA	NA	NA
		Total CRs:	5E-05	1E-08	2E-08	5E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	1.6	NA	NA	NA	NA
7440-38-2	Arsenic	12	3E-05	7E-09	1E-08	3E-05
7440-28-0	Thallium	2.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	3E-05	7E-09	1E-08	3E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Table F-5-22. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IR_S	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	2.10E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7440-38-2	Arsenic	2.48E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	4E-02
7440-39-3	Barium	1.64E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-43-9	Cadmium	5.10E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-04
7440-47-3	Chromium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	2.75E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-04
7440-02-0	Nickel	1.79E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	4E-04
7782-49-2	Selenium	9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	8E-05
7440-28-0	Thallium	4.69E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-01
7440-61-1	Uranium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	2.25E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
																			Total HI_{ing} =	1E-01
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-38-2	Arsenic	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-01
7440-39-3	Barium	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-43-9	Cadmium	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-02-0	Nickel	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-28-0	Thallium	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	4E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
																			Total HI_{ing} =	8E-01
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-38-2	Arsenic	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-28-0	Thallium	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	4E-01

Table F-5-22. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IR_S	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-04
7440-38-2	Arsenic	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-39-3	Barium	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-43-9	Cadmium	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-05
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	9E-05
7440-02-0	Nickel	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-05
7440-28-0	Thallium	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	7E-04
																			Total HI_{ing} =	3E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-38-2	Arsenic	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
7440-28-0	Thallium	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-38-2	Arsenic	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-39-3	Barium	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-43-9	Cadmium	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-02-0	Nickel	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
																			Total HI_{ing} =	3E-01

Table F-5-22. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IR_S	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Road Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-38-2	Arsenic	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-02
7440-28-0	Thallium	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	7E-02
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	1E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-38-2	Arsenic	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	4E-02
7440-39-3	Barium	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-43-9	Cadmium	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-04
7440-02-0	Nickel	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	8E-05
7440-28-0	Thallium	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	4E-02
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
																			Total HI_{ing} =	8E-02
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.55E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-04
7440-38-2	Arsenic	1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-28-0	Thallium	2.46E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-61-1	Uranium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =	4E-03

Table F-5-22. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC x IR_s x FI x CF x EF x ED x (1 / RfD_o)) / (BW x AT_{nc}) = HQ_{ing}
	Units:	mg/kg x mg/day x unitless x mg/kg x days/yr x yr x mg/kg-day x kg x days = unitless
CAS No.	**COC**	
Recreational User/Trespasser (Surface Soil) - Chronic Exposures		
7440-36-0	Antimony	(2.10E+00 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 4.00E-04)) / (4.43E+01 x 3.29E+03) = 4E-04
7440-38-2	Arsenic	(2.48E+01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 3.00E-04)) / (4.43E+01 x 3.29E+03) = 7E-03
7440-39-3	Barium	(1.64E+02 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 2.00E-01)) / (4.43E+01 x 3.29E+03) = 7E-05
7440-43-9	Cadmium	(5.10E-01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 1.00E-03)) / (4.43E+01 x 3.29E+03) = 4E-05
7440-47-3	Chromium	(Not a COC x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 3.00E-03)) / (4.43E+01 x 3.29E+03) = NA
7439-98-7	Molydenum	(2.75E+00 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 5.00E-03)) / (4.43E+01 x 3.29E+03) = 4E-05
7440-02-0	Nickel	(1.79E+01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 2.00E-02)) / (4.43E+01 x 3.29E+03) = 7E-05
7782-49-2	Selenium	(9.20E-01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 5.00E-03)) / (4.43E+01 x 3.29E+03) = 1E-05
7440-28-0	Thallium	(4.69E+00 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 2.00E-05)) / (4.43E+01 x 3.29E+03) = 2E-02
7440-61-1	Uranium	(Not a COC x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 3.00E-03)) / (4.43E+01 x 3.29E+03) = NA
7440-62-2	Vanadium	(2.25E+01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 9.00E+00 x (1 / 5.04E-03)) / (4.43E+01 x 3.29E+03) = 4E-04
		Total HI_{ing} = 3E-02

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable

Table F-5-23. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

Equation:		(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
Units:			mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(	2.10E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-06
7440-39-3	Barium	(	1.64E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-06
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-06
7440-39-3	Barium	(	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	2E-06
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7440-28-0	Thallium	(	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	1E-06

Table F-5-23. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-08
7440-39-3	Barium	(	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	9E-08
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-28-0	Thallium	(	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-08
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(	2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	8E-07
7440-39-3	Barium	(	1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	8E-07
Road Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7440-28-0	Thallium	(	2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-07

Table F-5-23. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(2.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7440-39-3	Barium	(1.64E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =		1E-06
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.55E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	7E-07
7440-28-0	Thallium	(2.46E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =		7E-07

Table F-5-23. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																		
Recreational User/Trespasser (Surface Soil)																			
7440-36-0	Antimony	(2.10E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (4.43E+01	x	2.56E+04	) =	4E-07
7440-39-3	Barium	(1.64E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
																		Total CR_{ing} =	4E-07

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-24. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	(1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr			mg/kg-day		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(2.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	2E-02
7440-38-2	Arsenic	(2.48E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	3E-01
7440-39-3	Barium	(1.64E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-01	)) /	9.49E+03	=	3E-03
7440-43-9	Cadmium	(5.10E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	1.00E-03	)) /	9.49E+03	=	2E-03
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	2E-03
7440-02-0	Nickel	(1.79E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-02	)) /	9.49E+03	=	3E-03
7782-49-2	Selenium	(9.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	7E-04
7440-28-0	Thallium	(4.69E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	9E-01
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.04E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =		**1E+00**
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(1.55E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	2E-02
7440-38-2	Arsenic	(1.20E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	2E-01
7440-28-0	Thallium	(2.46E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	5E-01
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
															Total HI_{ing} =		6E-01

IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable.
Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-25. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Parcel 10K530087

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC															
Resident (Surface Soil)																
7440-36-0	Antimony	(2.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(2.48E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	5E-05
7440-39-3	Barium	(1.64E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(5.10E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(1.79E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(9.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(4.69E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
															Total CR =	5E-05
Resident (Subsurface Soil)																
7440-36-0	Antimony	(1.55E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(1.20E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	3E-05
7440-28-0	Thallium	(2.46E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
															Total CR =	3E-05

"---" - Value not available
IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-26. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	9E-03
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	7E-05
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																					Total HI_{derm} =	9E-03
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-02
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-28-0	Thallium	(2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	1E-02

Table F-5-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-05
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	8E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-04
7440-28-0	Thallium	(2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	4E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	8E-03

Table F-5-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																						
Road Worker (Subsurface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	(	1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-28-0	Thallium	(	2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																						Total HI_{derm} =	4E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	(	2.10E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-39-3	Barium	(	1.64E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	2E-05
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																						Total HI_{derm} =	1E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	(	1.55E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	6E-04
7440-28-0	Thallium	(	2.46E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																						Total HI_{derm} =	6E-04

Table F-5-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(2.10E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	3E-03
7440-39-3	Barium	(1.64E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	3E-05
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(1.79E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(9.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(4.69E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	3E-03

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Industrial Worker (Surface Soil)																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	1E-06
Construction Worker (Surface Soil)																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-07
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	1E-07
Construction Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-08
7440-28-0	Thallium	(2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	6E-08

Table F-5-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Utility Worker (Surface Soil)																						
7440-36-0	Antimony	2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-09
7440-39-3	Barium	1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		5E-09
Utility Worker (Subsurface Soil)																						
7440-36-0	Antimony	1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-09
7440-28-0	Thallium	2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		3E-09
Road Worker (Surface Soil)																						
7440-36-0	Antimony	2.10E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	2.48E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-08
7440-39-3	Barium	1.64E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	5.10E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	2.75E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	1.79E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	4.69E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.25E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		5E-08

Table F-5-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Road Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.55E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(2.46E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	2E-08
Maintenance Worker (Surface Soil)																						
7440-36-0	Antimony	(2.10E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-08
7440-39-3	Barium	(1.64E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	5E-08
Maintenance Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.55E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.20E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-08
7440-28-0	Thallium	(2.46E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	3E-08

Table F-5-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Recreational User/Trespasser (Surface Soil)																						
7440-36-0	Antimony	(2.10E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.48E+01	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	2E-07
7440-39-3	Barium	(1.64E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(5.10E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.75E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.79E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(4.69E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.25E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	2E-07

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-29. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

	Equation:	(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	(	1	/	RfD_d	)	)	/	AT_{nc}	)	=	HQ_{derm}
	Units:		mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr					mg/kg-day				days			unitless
CAS No.	COC																						
Resident (Surface Soil)																							
7440-36-0	Antimony	(	2.10E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	6.00E-05	)	)	/	9.49E+03	)	=	NA
7440-38-2	Arsenic	(	2.48E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	)	=	3E-02
7440-39-3	Barium	(	1.64E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	1.40E-02	)	)	/	9.49E+03	)	=	NA
7440-43-9	Cadmium	(	5.10E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	(	1	/	2.50E-05	)	)	/	9.49E+03	)	=	2E-04
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	7.50E-05	)	)	/	9.49E+03	)	=	NA
7439-98-7	Molydenum	(	2.75E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	)	=	NA
7440-02-0	Nickel	(	1.79E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	8.00E-04	)	)	/	9.49E+03	)	=	NA
7782-49-2	Selenium	(	9.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	)	=	NA
7440-28-0	Thallium	(	4.69E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	)	=	NA
7440-62-2	Vanadium	(	2.25E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	1.31E-04	)	)	/	9.49E+03	)	=	NA
																						Total HI_{derm} =	3E-02
Resident (Subsurface Soil)																							
7440-36-0	Antimony	(	1.55E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	6.00E-05	)	)	/	9.49E+03	)	=	NA
7440-38-2	Arsenic	(	1.20E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	)	=	1E-02
7440-28-0	Thallium	(	2.46E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	)	=	NA
																						Total HI_{derm} =	1E-02

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-30. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Parcel 10K530087

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	2.10E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.48E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	1E-08
7440-39-3	Barium	(	1.64E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	5.10E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.75E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.79E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	4.69E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.25E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
															Total CR_{derm}	=	1E-08
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	1.55E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.20E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	7E-09
7440-28-0	Thallium	(	2.46E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
															Total CR_{derm}	=	7E-09

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-31. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	**=**	**(**	**(**	**SA_{s-cr}**	**x**	**AF_{s-cr}**	**x**	**ED_{cr}**	**)**	**/**	**BW_c**	**)**	**+**	**(**	**(**	**SA_{s-ar}**	**x**	**AF_{s-ar}**	**x**	**ED_{ar}**	**)**	**/**	**BW_a**	**)**
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-32. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	**(**	**EPC**	**x (1 /**	**PEF**	**) x**	**ET**	**x**	**EF**	**x**	**ED**	**x (1 /**	**RfC**	**)) /**	**AT_{nc}**	**=**	**HQ_{inh}**
	Units:		**mg/kg**		**m^3/kg**		**hours/day**		**days/year**		**years**		**mg/m^3**		**hours**		**unitless**
CAS No.	**COC**																
Industrial Worker (Surface Soil) - Chronic Exposures																	
7440-36-0	Antimony	(	2.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-38-2	Arsenic	(	2.48E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05	)) /	2.19E+05	=	4E-02
7440-39-3	Barium	(	1.64E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-04	)) /	2.19E+05	=	7E-03
7440-43-9	Cadmium	(	5.10E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05	)) /	2.19E+05	=	1E-03
7440-47-3	Chromium	(	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-04	)) /	2.19E+05	=	NA
7439-98-7	Molydenum	(	2.75E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-02-0	Nickel	(	1.79E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	9.00E-05	)) /	2.19E+05	=	5E-03
7782-49-2	Selenium	(	9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) /	2.19E+05	=	1E-06
7440-28-0	Thallium	(	4.69E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-05	)) /	2.19E+05	=	NA
7440-62-2	Vanadium	(	2.25E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
															Total HI_{inh}	**=**	5E-02
Construction Worker (Surface Soil) - Subchronic Exposures																	
7440-36-0	Antimony	(	2.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(	2.48E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	4E-02
7440-39-3	Barium	(	1.64E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	7E-04
7440-43-9	Cadmium	(	5.10E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(	2.75E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(	1.79E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	2E-03
7782-49-2	Selenium	(	9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(	4.69E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(	2.25E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
															Total HI_{inh}	**=**	4E-02

Table F-5-32. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC	x (1 / PEF)	x ET	x EF	x ED	x (1 / RfC))	/ AT_{nc}	= HQ_{inh}
	Units:	mg/kg	m^3/kg	hours/day	days/year	years	mg/m^3	hours	unitless
CAS No.	**COC**								
Construction Worker (Subsurface Soil) - Subchronic Exposures									
7440-36-0	Antimony	1.55E+00	1.00E+07	8.00E+00	2.50E+02	1.00E+00	---	8.76E+03	NA
7440-38-2	Arsenic	1.20E+01	1.00E+07	8.00E+00	2.50E+02	1.00E+00	1.50E-05	8.76E+03	2E-02
7440-28-0	Thallium	2.46E+00	1.00E+07	8.00E+00	2.50E+02	1.00E+00	---	8.76E+03	NA
7440-61-1	Uranium	Not a COC	1.00E+07	8.00E+00	2.50E+02	1.00E+00	1.00E-04	8.76E+03	NA
								Total HI_{inh} =	2E-02
Utility Worker (Surface Soil) - Subchronic Exposures									
7440-36-0	Antimony	2.10E+00	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-38-2	Arsenic	2.48E+01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	1.50E-05	8.76E+03	2E-03
7440-39-3	Barium	1.64E+02	1.00E+07	8.00E+00	1.00E+01	1.00E+00	5.00E-03	8.76E+03	3E-05
7440-43-9	Cadmium	5.10E-01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-47-3	Chromium	Not a COC	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7439-98-7	Molydenum	2.75E+00	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-02-0	Nickel	1.79E+01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	2.00E-04	8.76E+03	8E-05
7782-49-2	Selenium	9.20E-01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-28-0	Thallium	4.69E+00	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-61-1	Uranium	Not a COC	1.00E+07	8.00E+00	1.00E+01	1.00E+00	1.00E-04	8.76E+03	NA
7440-62-2	Vanadium	2.25E+01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
								Total HI_{inh} =	2E-03
Utility Worker (Subsurface Soil) - Subchronic Exposures									
7440-36-0	Antimony	1.55E+00	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-38-2	Arsenic	1.20E+01	1.00E+07	8.00E+00	1.00E+01	1.00E+00	1.50E-05	8.76E+03	7E-04
7440-28-0	Thallium	2.46E+00	1.00E+07	8.00E+00	1.00E+01	1.00E+00	---	8.76E+03	NA
7440-61-1	Uranium	Not a COC	1.00E+07	8.00E+00	1.00E+01	1.00E+00	1.00E-04	8.76E+03	NA
								Total HI_{inh} =	7E-04

Table F-5-32. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(2.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(2.48E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	1E-02
7440-39-3	Barium	(1.64E+02	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	3E-04
7440-43-9	Cadmium	(5.10E-01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(2.75E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.79E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	7E-04
7782-49-2	Selenium	(9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(4.69E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.25E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		1E-02
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.55E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	7E-03
7440-28-0	Thallium	(2.46E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		7E-03

Table F-5-32. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Maintenance Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(2.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(2.48E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	4E-03
7440-39-3	Barium	(1.64E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) /	5.78E+04	=	8E-05
7440-43-9	Cadmium	(5.10E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7439-98-7	Molydenum	(2.75E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-02-0	Nickel	(1.79E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) /	5.78E+04	=	2E-04
7782-49-2	Selenium	(9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-28-0	Thallium	(4.69E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA
7440-62-2	Vanadium	(2.25E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
														Total HI_{inh} =		4E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.55E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	2E-03
7440-28-0	Thallium	(2.46E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA
														Total HI_{inh} =		2E-03

Table F-5-32. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(2.10E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-38-2	Arsenic	(2.48E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.50E-05	)) /	7.88E+04	=	7E-06
7440-39-3	Barium	(1.64E+02	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-04	)) /	7.88E+04	=	1E-06
7440-43-9	Cadmium	(5.10E-01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-05	)) /	7.88E+04	=	2E-07
7440-47-3	Chromium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-04	)) /	7.88E+04	=	NA
7439-98-7	Molydenum	(2.75E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-02-0	Nickel	(1.79E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	9.00E-05	)) /	7.88E+04	=	9E-07
7782-49-2	Selenium	(9.20E-01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) /	7.88E+04	=	2E-10
7440-28-0	Thallium	(4.69E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-05	)) /	7.88E+04	=	NA
7440-62-2	Vanadium	(2.25E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
															Total HI_{inh} =	1E-05

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation is not applicable

Table F-5-33. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(\mu g/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Industrial Worker (Surface Soil)																								
7440-36-0	Antimony	(	2.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	2.48E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)	)	/	6.13E+05	=	9E-07
7440-39-3	Barium	(	1.64E+02	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	5.10E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)	)	/	6.13E+05	=	7E-09
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	2.75E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	1.79E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)	)	/	6.13E+05	=	4E-08
7782-49-2	Selenium	(	9.20E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	4.69E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	2.25E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	9E-07
Construction Worker (Surface Soil)																								
7440-36-0	Antimony	(	2.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	2.48E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	3E-08
7440-39-3	Barium	(	1.64E+02	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	5.10E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	3E-10
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	2.75E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	1.79E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	2E-09
7782-49-2	Selenium	(	9.20E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	4.69E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	2.25E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	4E-08

Table F-5-33. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(\mu g/m^3)^{-1}$				hours		unitless
CAS No.	**COC**																							
Construction Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	1.55E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.20E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	2E-08
7440-28-0	Thallium	(	2.46E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	2E-08
Utility Worker (Surface Soil)																								
7440-36-0	Antimony	(	2.10E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	2.48E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	1E-09
7440-39-3	Barium	(	1.64E+02	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	5.10E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	1E-11
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	2.75E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	1.79E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	6E-11
7782-49-2	Selenium	(	9.20E-01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	4.69E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	2.25E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	1E-09
Utility Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	1.55E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.20E+01	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	7E-10
7440-28-0	Thallium	(	2.46E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	7E-10

Table F-5-33. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(2.10E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.48E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-39-3	Barium	(1.64E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(5.10E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	1E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.79E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	5E-10
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(4.69E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.55E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	6E-09
7440-28-0	Thallium	(2.46E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-09

Table F-5-33. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	(2.10E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.48E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	2E-08
7440-39-3	Barium	(1.64E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(5.10E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	2E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.79E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(4.69E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	3E-08
Maintenance Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.55E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-28-0	Thallium	(2.46E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08

Table F-5-33. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(2.10E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.48E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	6E-11
7440-39-3	Barium	(1.64E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(5.10E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	5E-13
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.79E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	3E-12
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(4.69E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-11

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-34. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

Equation:		(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x RfC)) / AT_c = CR_{inh}																		
Units:		mg/kg		µg/mg			m^3/kg		hours/day		days/year			years		years		mg/m^3		hours		unitless
CAS No.	**COC**																					
Resident (Surface Soil)																						
7440-36-0	Antimony	(2.10E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(2.48E+01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	2E-10
7440-39-3	Barium	(1.64E+02	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	5.00E-04	)) /	2.28E+05	=	4E-08
7440-43-9	Cadmium	(5.10E-01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-05	)) /	2.28E+05	=	3E-12
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-04	)) /	2.28E+05	=	NA
7439-98-7	Molydenum	(2.75E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(1.79E+01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	9.00E-05	)) /	2.28E+05	=	9E-10
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.00E-02	)) /	2.28E+05	=	1E-08
7440-28-0	Thallium	(4.69E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
7440-62-2	Vanadium	(2.25E+01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		6E-08	
Resident (Subsurface Soil)																						
7440-36-0	Antimony	(1.55E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(1.20E+01	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	1E-10
7440-28-0	Thallium	(2.46E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		1E-10	

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-35. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Parcel 10K530087

	Equation:	**(EPC**	**x CF**	**x (1 / PEF)**	**x ET**	**x EF**	**) x (ED_{cr}**	**+ ED_{ar}**	**) x IUR**	**)) / AT_c**	**= CR_{inh}**
	Units:	**mg/kg**	**µg/mg**	**m^3/kg**	**hours/day**	**days/year**	**years**	**years**	**$(\mu g/m^3)^{-1}$**	**hours**	**unitless**
CAS No.	**COC**										
Resident (Surface Soil)											
7440-36-0	Antimony	2.10E+00	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-38-2	Arsenic	2.48E+01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	4.30E-03	6.13E+05	2E-08
7440-39-3	Barium	1.64E+02	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-43-9	Cadmium	5.10E-01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	1.80E-03	6.13E+05	2E-10
7440-47-3	Chromium	Not a COC	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	1.20E-02	6.13E+05	NA
7439-98-7	Molydenum	2.75E+00	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-02-0	Nickel	1.79E+01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	2.60E-04	6.13E+05	9E-10
7782-49-2	Selenium	9.20E-01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-28-0	Thallium	4.69E+00	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-61-1	Uranium	Not a COC	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-62-2	Vanadium	2.25E+01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
										Total CR_{inh} =	2E-08
Resident (Subsurface Soil)											
7440-36-0	Antimony	1.55E+00	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-38-2	Arsenic	1.20E+01	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	4.30E-03	6.13E+05	1E-08
7440-28-0	Thallium	2.46E+00	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
7440-61-1	Uranium	Not a COC	1.00E+03	1.36E+09	1.84E+01	3.50E+02	6.00E+00	2.00E+01	---	6.13E+05	NA
										Total CR_{inh} =	1E-08

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation not applicable

Table F-5-36. Surface Soil EPCs for Metal COCs at Parcel 10K530087

CAS No.	COC	Surface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	2.1
7440-38-2	Arsenic	24.79
7440-39-3	Barium	163.5
7440-43-9	Cadmium	0.51
7440-47-3	Chromium	Not a COC
7439-98-7	Molydenum	2.748
7440-02-0	Nickel	17.93
7782-49-2	Selenium	0.92
7440-28-0	Thallium	4.69
7440-61-1	Uranium	Not a COC
7440-62-2	Vanadium	22.46

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Properties 01(L) and Parcel 10K530087* (USACE 2010e).

Table F-5-37. Subsurface Soil EPCs for Metal COCs at Parcel 10K530087

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	1.55
7440-38-2	Arsenic	12.04
7440-28-0	Thallium	2.46
7440-61-1	Uranium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c).

Table F-5-38. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the IUR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-5-39. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	47	5E-02	NA	NA	5E-02	5E-02	5E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	1E-02	3E-03	1E-02	3E-02	3E-02	NA	3E-02	NA	NA	NA	NA
7440-39-3	Barium	161	3E-04	NA	7E-03	8E-03	8E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	1E-03	3E-04	5E-03	7E-03	NA	7E-03	NA	7E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	3E-04	NA	NA	3E-04	NA	NA	NA	NA	3E-04	NA	NA
7440-02-0	Nickel	17	4E-04	NA	4E-03	5E-03	NA	5E-03	NA	NA	NA	5E-03	NA
7782-49-2	Selenium	2.6	2E-04	NA	3E-06	2E-04	NA	NA	2E-04	NA	NA	NA	2E-04
7440-28-0	Thallium	6.5	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	2E-01	3E-03	3E-02	2E-01	9E-02	6E-02	2E-01	7E-03	3E-04	5E-03	1E-01
Construction Worker (Surface Soil)													
7440-36-0	Antimony	47	5E-01	NA	NA	5E-01	5E-01	5E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	1E-01	7E-03	1E-02	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-39-3	Barium	161	3E-03	NA	7E-04	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	1E-02	2E-03	NA	1E-02	NA	1E-02	NA	1E-02	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	3E-03	NA	NA	3E-03	NA	NA	NA	NA	3E-03	NA	NA
7440-02-0	Nickel	17	3E-03	NA	2E-03	5E-03	NA	5E-03	NA	NA	NA	5E-03	NA
7782-49-2	Selenium	2.6	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-28-0	Thallium	6.5	5E-01	NA	NA	5E-01	NA	NA	5E-01	NA	NA	NA	5E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	**1E+00**	9E-03	2E-02	**1E+00**	6E-01	5E-01	7E-01	1E-02	3E-03	5E-03	5E-01
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	26	3E-01	NA	NA	3E-01	3E-01	3E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	8E-03	2E-02	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	7.5	6E-01	NA	NA	6E-01	NA	NA	6E-01	NA	NA	NA	6E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	**1E+00**	8E-03	2E-02	**1E+00**	4E-01	3E-01	8E-01	NA	NA	NA	6E-01

Table F-5-39. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	47	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	5E-03	3E-04	5E-04	5E-03	5E-03	NA	5E-03	NA	NA	NA	NA
7440-39-3	Barium	161	1E-04	NA	3E-05	2E-04	2E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	4E-04	6E-05	NA	5E-04	NA	5E-04	NA	5E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	1E-04	NA	NA	1E-04	NA	NA	NA	NA	1E-04	NA	NA
7440-02-0	Nickel	17	1E-04	NA	8E-05	2E-04	NA	2E-04	NA	NA	NA	2E-04	NA
7782-49-2	Selenium	2.6	9E-05	NA	NA	9E-05	NA	NA	9E-05	NA	NA	NA	9E-05
7440-28-0	Thallium	6.5	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	9E-04	NA	NA	9E-04	NA	9E-04	NA	NA	NA	NA	NA
		Total HIs:	5E-02	3E-04	6E-04	5E-02	2E-02	2E-02	3E-02	5E-04	1E-04	2E-04	2E-02
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	26	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	6E-03	3E-04	6E-04	7E-03	7E-03	NA	7E-03	NA	NA	NA	NA
7440-28-0	Thallium	7.5	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	4E-02	3E-04	6E-04	4E-02	2E-02	1E-02	3E-02	NA	NA	NA	2E-02
Road Worker (Surface Soil)													
7440-36-0	Antimony	47	2E-01	NA	NA	2E-01	2E-01	2E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	4E-02	3E-03	5E-03	5E-02	5E-02	NA	5E-02	NA	NA	NA	NA
7440-39-3	Barium	161	1E-03	NA	3E-04	1E-03	1E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	4E-03	6E-04	NA	4E-03	NA	4E-03	NA	4E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	1E-03	NA	NA	1E-03	NA	NA	NA	NA	1E-03	NA	NA
7440-02-0	Nickel	17	1E-03	NA	7E-04	2E-03	NA	2E-03	NA	NA	NA	2E-03	NA
7782-49-2	Selenium	2.6	8E-04	NA	NA	8E-04	NA	NA	8E-04	NA	NA	NA	8E-04
7440-28-0	Thallium	6.5	2E-01	NA	NA	2E-01	NA	NA	2E-01	NA	NA	NA	2E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	8E-03	NA	NA	8E-03	NA	8E-03	NA	NA	NA	NA	NA
		Total HIs:	4E-01	3E-03	6E-03	4E-01	2E-01	2E-01	2E-01	4E-03	1E-03	2E-03	2E-01

Table F-5-39. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	26	1E-01	NA	NA	1E-01	1E-01	1E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	5E-02	3E-03	6E-03	6E-02	6E-02	NA	6E-02	NA	NA	NA	NA
7440-28-0	Thallium	7.5	2E-01	NA	NA	2E-01	NA	NA	2E-01	NA	NA	NA	2E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	4E-01	3E-03	6E-03	4E-01	2E-01	1E-01	3E-01	NA	NA	NA	2E-01
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	47	5E-02	NA	NA	5E-02	5E-02	5E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	1E-02	4E-04	1E-03	1E-02	1E-02	NA	1E-02	NA	NA	NA	NA
7440-39-3	Barium	161	3E-04	NA	8E-05	4E-04	4E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	2E-03	9E-05	NA	2E-03	NA	2E-03	NA	2E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	3E-04	NA	NA	3E-04	NA	NA	NA	NA	3E-04	NA	NA
7440-02-0	Nickel	17	4E-04	NA	2E-04	5E-04	NA	5E-04	NA	NA	NA	5E-04	NA
7782-49-2	Selenium	2.6	2E-04	NA	NA	2E-04	NA	NA	2E-04	NA	NA	NA	2E-04
7440-28-0	Thallium	6.5	6E-02	NA	NA	6E-02	NA	NA	6E-02	NA	NA	NA	6E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	1E-01	5E-04	2E-03	1E-01	6E-02	6E-02	7E-02	2E-03	3E-04	5E-04	6E-02
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	26	3E-03	NA	NA	3E-03	3E-03	3E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	2E-03	5E-04	2E-03	4E-03	4E-03	NA	4E-03	NA	NA	NA	NA
7440-28-0	Thallium	7.5	7E-03	NA	NA	7E-03	NA	NA	7E-03	NA	NA	NA	7E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	1E-02	5E-04	2E-03	1E-02	7E-03	3E-03	1E-02	NA	NA	NA	7E-03

Table F-5-39. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	47	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	2E-03	1E-03	2E-06	3E-03	3E-03	NA	3E-03	NA	NA	NA	NA
7440-39-3	Barium	161	6E-05	NA	1E-06	7E-05	7E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	2E-04	1E-04	1E-06	3E-04	NA	3E-04	NA	3E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	6E-05	NA	NA	6E-05	NA	NA	NA	NA	6E-05	NA	NA
7440-02-0	Nickel	17	7E-05	NA	8E-07	7E-05	NA	7E-05	NA	NA	NA	7E-05	NA
7782-49-2	Selenium	2.6	4E-05	NA	6E-10	4E-05	NA	NA	4E-05	NA	NA	NA	4E-05
7440-28-0	Thallium	6.5	3E-02	NA	NA	3E-02	NA	NA	3E-02	NA	NA	NA	3E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	4E-04	NA	NA	4E-04	NA	4E-04	NA	NA	NA	NA	NA
		Total HIs:	4E-02	1E-03	6E-06	4E-02	1E-02	1E-02	3E-02	3E-04	6E-05	7E-05	3E-02
Resident (Surface Soil)													
7440-36-0	Antimony	47	5E-01	NA	NA	5E-01	5E-01	5E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	1E-01	1E-02	8E-11	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-39-3	Barium	161	3E-03	NA	5E-08	3E-03	3E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	9E-03	1E-03	1E-11	1E-02	NA	1E-02	NA	1E-02	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	3E-03	NA	NA	3E-03	NA	NA	NA	NA	3E-03	NA	NA
7440-02-0	Nickel	17	3E-03	NA	9E-10	3E-03	NA	3E-03	NA	NA	NA	3E-03	NA
7782-49-2	Selenium	2.6	2E-03	NA	3E-08	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-28-0	Thallium	6.5	**1E+00**	NA	NA	**1E+00**	NA	NA	**1E+00**	NA	NA	NA	**1E+00**
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	26	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	**2E+00**	1E-02	8E-08	**2E+00**	6E-01	5E-01	**1E+00**	1E-02	3E-03	3E-03	**1E+00**
Resident (Subsurface Soil)													
7440-36-0	Antimony	26	3E-01	NA	NA	3E-01	3E-01	3E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	1E-02	1E-10	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-28-0	Thallium	7.5	**1E+00**	NA	NA	**1E+00**	NA	NA	**1E+00**	NA	NA	NA	**1E+00**
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	**2E+00**	1E-02	1E-10	**2E+00**	4E-01	3E-01	**2E+00**	NA	NA	NA	**1E+00**

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-40. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	2E-06	5E-07	3E-07	3E-06
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	4E-08	4E-08
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	3E-08	3E-08
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	2E-06	5E-07	4E-07	3E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	7E-07	4E-08	1E-08	8E-07
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	1E-09	1E-09
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	1E-09	1E-09
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	7E-07	4E-08	1E-08	8E-07
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	26	NA	NA	NA	NA
7440-38-2	Arsenic	10	9E-07	5E-08	1E-08	1E-06
7440-28-0	Thallium	7.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	9E-07	5E-08	1E-08	1E-06

Table F-5-40. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	3E-08	2E-09	5E-10	3E-08
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	6E-11	6E-11
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	6E-11	6E-11
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	3E-08	2E-09	6E-10	3E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	26	NA	NA	NA	NA
7440-38-2	Arsenic	10	4E-08	2E-09	6E-10	4E-08
7440-28-0	Thallium	7.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	4E-08	2E-09	6E-10	4E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	3E-07	2E-08	4E-09	3E-07
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	5E-10	5E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	5E-10	5E-10
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	3E-07	2E-08	5E-09	3E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	26	NA	NA	NA	NA
7440-38-2	Arsenic	10	3E-07	2E-08	5E-09	3E-07
7440-28-0	Thallium	7.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	3E-07	2E-08	5E-09	3E-07

Table F-5-40. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	5E-07	2E-08	8E-09	5E-07
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	1E-09	1E-09
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	1E-09	1E-09
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	5E-07	2E-08	1E-08	5E-07
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	26	NA	NA	NA	NA
7440-38-2	Arsenic	10	6E-07	2E-08	1E-08	6E-07
7440-28-0	Thallium	7.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	6E-07	2E-08	1E-08	6E-07
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	1E-07	6E-08	2E-11	2E-07
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	2E-12	2E-12
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	2E-12	2E-12
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	1E-07	6E-08	3E-11	2E-07

Table F-5-40. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at VP-02(L)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	47	NA	NA	NA	NA
7440-38-2	Arsenic	8.4	2E-05	5E-09	7E-09	2E-05
7440-39-3	Barium	161	NA	NA	NA	NA
7440-43-9	Cadmium	2.4	NA	NA	9E-10	9E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	4.0	NA	NA	NA	NA
7440-02-0	Nickel	17	NA	NA	9E-10	9E-10
7782-49-2	Selenium	2.6	NA	NA	NA	NA
7440-28-0	Thallium	6.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	2E-05	5E-09	9E-09	2E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	26	NA	NA	NA	NA
7440-38-2	Arsenic	10	2E-05	6E-09	9E-09	2E-05
7440-28-0	Thallium	7.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	2E-05	6E-09	9E-09	2E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Table F-5-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																				
Industrial Worker (Surface Soil) - Chronic Exposures																					
7440-36-0	Antimony	(	4.73E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	5E-02
7440-38-2	Arsenic	(	8.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	1E-02
7440-39-3	Barium	(	1.61E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-43-9	Cadmium	(	2.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	1E-03
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-02-0	Nickel	(	1.65E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	4E-04
7782-49-2	Selenium	(	2.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-04
7440-28-0	Thallium	(	6.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-01
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
																				Total HI_{ing} =	2E-01
Construction Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-01
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
																				Total HI_{ing} =	**1E+00**
Construction Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-01
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-28-0	Thallium	(	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{ing} =	**1E+00**

Table F-5-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	4E-04
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	9E-05
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	9E-04
																				Total HI_{ing} =	5E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-28-0	Thallium	(	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{ing} =	4E-02
Road Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
																				Total HI_{ing} =	4E-01

Table F-5-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Road Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-38-2	Arsenic	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-28-0	Thallium	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	4E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	5E-02
7440-38-2	Arsenic	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-02
7440-39-3	Barium	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-43-9	Cadmium	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-02-0	Nickel	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7782-49-2	Selenium	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-04
7440-28-0	Thallium	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	6E-02
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
																			Total HI_{ing} =	1E-01
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	2.62E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	3E-03
7440-38-2	Arsenic	1.02E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-28-0	Thallium	7.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	7E-03
7440-61-1	Uranium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =	1E-02

Table F-5-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**		**kg**		**days**		**unitless**
CAS No.	**COC**																				
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																					
7440-36-0	Antimony	(	4.73E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	1E-02
7440-38-2	Arsenic	(	8.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	2E-03
7440-39-3	Barium	(	1.61E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7440-43-9	Cadmium	(	2.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-04
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7440-02-0	Nickel	(	1.65E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	) =	7E-05
7782-49-2	Selenium	(	2.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	4E-05
7440-28-0	Thallium	(	6.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	3E-02
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	) =	4E-04
																				Total HI_{ing} =	4E-02

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable
Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil)																				
7440-36-0	Antimony	(4.73E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-06
7440-39-3	Barium	(1.61E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.65E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(2.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(6.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	2E-06
Construction Worker (Surface Soil)																				
7440-36-0	Antimony	(4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	7E-07
7440-39-3	Barium	(1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	7E-07
Construction Worker (Subsurface Soil)																				
7440-36-0	Antimony	(2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7440-28-0	Thallium	(7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	9E-07

Table F-5-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-08
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	3E-08
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-28-0	Thallium	(	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-08
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	3E-07

Table F-5-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Road Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7440-28-0	Thallium	(	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	3E-07
Maintenance Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.73E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-07
7440-39-3	Barium	(	1.61E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	5E-07
Maintenance Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	2.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7440-28-0	Thallium	(	7.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	6E-07

Table F-5-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Recreational User/Trespasser (Surface Soil)																					
7440-36-0	Antimony	(	4.73E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	1E-07
7440-39-3	Barium	(	1.61E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	1E-07

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-43. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x (1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		mg/kg-day		days		unitless
CAS No.	COC															
Resident (Surface Soil)																
7440-36-0	Antimony	(4.73E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	5E-01
7440-38-2	Arsenic	(8.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	1E-01
7440-39-3	Barium	(1.61E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-01	)) /	9.49E+03	=	3E-03
7440-43-9	Cadmium	(2.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	1.00E-03	)) /	9.49E+03	=	9E-03
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	3E-03
7440-02-0	Nickel	(1.65E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-02	)) /	9.49E+03	=	3E-03
7782-49-2	Selenium	(2.60E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	2E-03
7440-28-0	Thallium	(6.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	**1E+00**
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.04E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =	**2E+00**
Resident (Subsurface Soil)																
7440-36-0	Antimony	(2.62E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	3E-01
7440-38-2	Arsenic	(1.02E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	1E-01
7440-28-0	Thallium	(7.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	**1E+00**
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	NA
															Total HI_{ing} =	**2E+00**

IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable.
Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-44. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at VP-02(L)

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	4.73E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	8.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	2E-05
7440-39-3	Barium	(	1.61E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	2.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	4.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	1.65E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	2.60E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	6.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	2.64E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	2E-05
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	2.62E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	1.02E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	2E-05
7440-28-0	Thallium	(	7.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	2E-05

"---" - Value not available
IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-45. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			mg/day		years		kg		mg/day		years		kg	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-46. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																						
Industrial Worker (Surface Soil) - Chronic Exposures																							
7440-36-0	Antimony	(	4.73E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	3E-03
7440-39-3	Barium	(	1.61E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																						Total HI_{derm} =	3E-03
Construction Worker (Surface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	(	4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
7440-39-3	Barium	(	1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																						Total HI_{derm} =	9E-03
Construction Worker (Subsurface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	(	2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-28-0	Thallium	(	7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																						Total HI_{derm} =	8E-03

Table F-5-46. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-39-3	Barium	1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-05
7440-47-3	Chromium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-39-3	Barium	1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-47-3	Chromium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-03

Table F-5-46. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-28-0	Thallium	(7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.73E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7440-39-3	Barium	(1.61E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	9E-05
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(1.65E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(2.60E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(6.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	5E-04
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(2.62E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	5E-04
7440-28-0	Thallium	(7.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	5E-04

Table F-5-46. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(4.73E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	1E-03
7440-39-3	Barium	(1.61E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	1E-04
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(1.65E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(2.60E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(6.50E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	1E-03

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-47. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																					
Industrial Worker (Surface Soil)																						
7440-36-0	Antimony	(4.73E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-07
7440-39-3	Barium	(1.61E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.65E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(2.60E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(6.50E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	5E-07
Construction Worker (Surface Soil)																						
7440-36-0	Antimony	(4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-39-3	Barium	(1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	4E-08
Construction Worker (Subsurface Soil)																						
7440-36-0	Antimony	(2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-08
7440-28-0	Thallium	(7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	5E-08

Table F-5-47. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																						
Utility Worker (Surface Soil)																							
7440-36-0	Antimony	(	4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-09
7440-39-3	Barium	(	1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-09
Utility Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-09
7440-28-0	Thallium	(	7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-09
Road Worker (Surface Soil)																							
7440-36-0	Antimony	(	4.73E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-39-3	Barium	(	1.61E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-08

Table F-5-47. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																						
Road Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	2.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(	7.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-08
Maintenance Worker (Surface Soil)																							
7440-36-0	Antimony	(	4.73E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-39-3	Barium	(	1.61E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-08
Maintenance Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	2.62E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(	7.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-08

Table F-5-47. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																						
Recreational User/Trespasser (Surface Soil)																							
7440-36-0	Antimony	(	4.73E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	6E-08
7440-39-3	Barium	(	1.61E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	6E-08

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-48. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

	Equation:	(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x (1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(4.73E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(8.40E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	1E-02
7440-39-3	Barium	(1.61E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(2.40E+00	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x (1 /	2.50E-05	)) /	9.49E+03	) =	1E-03
7440-47-3	Chromium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(4.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(1.65E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(2.60E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(6.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(2.64E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.31E-04	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	1E-02
Resident (Subsurface Soil)																
7440-36-0	Antimony	(2.62E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	1E-02
7440-28-0	Thallium	(7.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	1E-02

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-49. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at VP-02(L)

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	4.73E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	8.40E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	5E-09
7440-39-3	Barium	(	1.61E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.40E+00	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	4.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.65E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	2.60E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	6.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.64E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	5E-09
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	2.62E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	6E-09
7440-28-0	Thallium	(	7.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	6E-09

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-50. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	**=**	**(**	**(**	**SA_{s-cr}**	**x**	**AF_{s-cr}**	**x**	**ED_{cr}**	**)**	**/**	**BW_c**	**)**	**+**	**(**	**(**	**SA_{s-ar}**	**x**	**AF_{s-ar}**	**x**	**ED_{ar}**	**)**	**/**	**BW_a**	**)**
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}												
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(4.73E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05	)) /	2.19E+05	=	1E-02
7440-39-3	Barium	(1.61E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-04	)) /	2.19E+05	=	7E-03
7440-43-9	Cadmium	(2.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05	)) /	2.19E+05	=	5E-03
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-04	)) /	2.19E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	9.00E-05	)) /	2.19E+05	=	4E-03
7782-49-2	Selenium	(2.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) /	2.19E+05	=	3E-06
7440-28-0	Thallium	(6.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-05	)) /	2.19E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
														Total HI_{inh} =		3E-02
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(4.73E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(8.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	1E-02
7440-39-3	Barium	(1.61E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	7E-04
7440-43-9	Cadmium	(2.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(4.00E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.65E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	2E-03
7782-49-2	Selenium	(2.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(6.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.64E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		2E-02

Table F-5-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(2.62E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	2E-02
7440-28-0	Thallium	(7.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		2E-02
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(4.73E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(8.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	5E-04
7440-39-3	Barium	(1.61E+02	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	3E-05
7440-43-9	Cadmium	(2.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(4.00E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.65E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	8E-05
7782-49-2	Selenium	(2.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(6.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.64E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		6E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(2.62E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	6E-04
7440-28-0	Thallium	(7.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		6E-04

Table F-5-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	**(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}**														
	Units:	**mg/kg**			**m^3/kg**		**hours/day**		**days/year**		**years**			**mg/m^3**		**hours**		**unitless**
CAS No.	**COC**																	
Road Worker (Surface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(4.73E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(8.40E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	1.50E-05	)) /	8.76E+03	=	5E-03
7440-39-3	Barium	(1.61E+02	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	5.00E-03	)) /	8.76E+03	=	3E-04
7440-43-9	Cadmium	(2.40E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(4.00E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.65E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	2.00E-04	)) /	8.76E+03	=	7E-04
7782-49-2	Selenium	(2.60E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(6.50E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.64E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
																Total HI_{inh} =		6E-03
Road Worker (Subsurface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(2.62E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	1.50E-05	)) /	8.76E+03	=	6E-03
7440-28-0	Thallium	(7.50E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 /	1.00E-04	)) /	8.76E+03	=	NA
																Total HI_{inh} =		6E-03

Table F-5-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Maintenance Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(4.73E+01	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.50E-05	/	5.78E+04	=	1E-03
7440-39-3	Barium	(1.61E+02	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	5.00E-03	/	5.78E+04	=	8E-05
7440-43-9	Cadmium	(2.40E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-47-3	Chromium	(Not a COC	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.00E-04	/	5.78E+04	=	2E-04
7782-49-2	Selenium	(2.60E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.00E-04	/	5.78E+04	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
														Total HI_{inh} =		2E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(2.62E+01	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.50E-05	/	5.78E+04	=	2E-03
7440-28-0	Thallium	(7.50E+00	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	/	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+07	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.00E-04	/	5.78E+04	=	NA
														Total HI_{inh} =		2E-03

Table F-5-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(4.73E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-38-2	Arsenic	(8.40E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.50E-05	)) /	7.88E+04	=	2E-06
7440-39-3	Barium	(1.61E+02	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-04	)) /	7.88E+04	=	1E-06
7440-43-9	Cadmium	(2.40E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-05	)) /	7.88E+04	=	1E-06
7440-47-3	Chromium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-04	)) /	7.88E+04	=	NA
7439-98-7	Molydenum	(4.00E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-02-0	Nickel	(1.65E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	9.00E-05	)) /	7.88E+04	=	8E-07
7782-49-2	Selenium	(2.60E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) /	7.88E+04	=	6E-10
7440-28-0	Thallium	(6.50E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-05	)) /	7.88E+04	=	NA
7440-62-2	Vanadium	(2.64E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
															Total HI_{inh} =	6E-06

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation is not applicable

Table F-5-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Industrial Worker (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)) /	6.13E+05	=	3E-07
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)) /	6.13E+05	=	4E-08
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)) /	6.13E+05	=	3E-08
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	4E-07
Construction Worker (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	1E-09
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Construction Worker (Subsurface Soil)																		
7440-36-0	Antimony	(2.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-28-0	Thallium	(7.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08

Table F-5-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Utility Worker (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	5E-10
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	6E-11
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	6E-11
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-10
Utility Worker (Subsurface Soil)																		
7440-36-0	Antimony	(2.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	6E-10
7440-28-0	Thallium	(7.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-10
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	4E-09
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	5E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	5E-10
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	5E-09

Table F-5-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(2.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	5E-09
7440-28-0	Thallium	(7.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	5E-09
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	8E-09
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	1E-09
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Maintenance Worker (Subsurface Soil)																		
7440-36-0	Antimony	(2.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-28-0	Thallium	(7.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08

Table F-5-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(4.73E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(8.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	2E-11
7440-39-3	Barium	(1.61E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-12
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.65E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	2E-12
7782-49-2	Selenium	(2.60E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(6.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.64E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	3E-11

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-53. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(	EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	RfC	)) /	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		mg/m^3		hours		unitless
CAS No.	**COC**																				
Resident (Surface Soil)																					
7440-36-0	Antimony	(	4.73E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	8.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	1.50E-05	)) /	2.28E+05	=	8E-11
7440-39-3	Barium	(	1.61E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	5.00E-04	)) /	2.28E+05	=	5E-08
7440-43-9	Cadmium	(	2.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	1.00E-05	)) /	2.28E+05	=	1E-11
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	1.00E-04	)) /	2.28E+05	=	NA
7439-98-7	Molydenum	(	4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(	1.65E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	9.00E-05	)) /	2.28E+05	=	9E-10
7782-49-2	Selenium	(	2.60E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	2.00E-02	)) /	2.28E+05	=	3E-08
7440-28-0	Thallium	(	6.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
7440-62-2	Vanadium	(	2.64E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	---	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		8E-08
Resident (Subsurface Soil)																					
7440-36-0	Antimony	(	2.62E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	1.02E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	1.50E-05	)) /	2.28E+05	=	1E-10
7440-28-0	Thallium	(	7.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.40E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		1E-10

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - HQ calculation is not applicable

Table F-5-54. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at VP-02(L)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																			
Resident (Surface Soil)																				
7440-36-0	Antimony	4.73E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	8.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	7E-09
7440-39-3	Barium	1.61E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	2.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	9E-10
7440-47-3	Chromium	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	1.65E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	9E-10
7782-49-2	Selenium	2.60E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	6.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	2.64E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	9E-09
Resident (Subsurface Soil)																				
7440-36-0	Antimony	2.62E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	1.02E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	9E-09
7440-28-0	Thallium	7.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	9E-09

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-55. Surface Soil EPCs for Metal COCs at VP-02(L)

CAS No.	COC	Surface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	47.3
7440-38-2	Arsenic	8.4
7440-39-3	Barium	160.6
7440-43-9	Cadmium	2.4
7440-47-3	Chromium	Not a COC
7439-98-7	Molydenum	4
7440-02-0	Nickel	16.5
7782-49-2	Selenium	2.6
7440-28-0	Thallium	6.5
7440-61-1	Uranium	Not a COC
7440-62-2	Vanadium	26.4

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L)* (USACE 2012h).

Table F-5-56. Subsurface Soil EPCs for Metal COCs at VP-02(L)

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	26.2
7440-38-2	Arsenic	10.2
7440-28-0	Thallium	7.5
7440-61-1	Uranium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L)* (USACE 2012h).

Table F-5-57. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)[1]			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Dermal Slope Factor[c] $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the IUR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-5-58. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Construction Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	6.2	6E-02	NA	NA	6E-02	6E-02	6E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	8E-03	2E-02	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	4.5	4E-01	NA	NA	4E-01	NA	NA	4E-01	NA	NA	NA	4E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	6E-01	8E-03	2E-02	6E-01	2E-01	6E-02	5E-01	NA	NA	NA	4E-01

Table F-5-58. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	6.2	3E-03	NA	NA	3E-03	3E-03	3E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	5E-03	3E-04	6E-04	6E-03	6E-03	NA	6E-03	NA	NA	NA	NA
7440-28-0	Thallium	4.5	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-02	3E-04	6E-04	2E-02	9E-03	3E-03	2E-02	NA	NA	NA	1E-02
Road Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F-5-58. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	6.2	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	5E-02	3E-03	5E-03	6E-02	6E-02	NA	6E-02	NA	NA	NA	NA
7440-28-0	Thallium	4.5	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-01	3E-03	5E-03	2E-01	8E-02	2E-02	2E-01	NA	NA	NA	1E-01
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	6.2	6.9E-04	NA	NA	7E-04	7E-04	7E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1.5E-03	5E-04	2E-03	4E-03	4E-03	NA	4E-03	NA	NA	NA	NA
7440-28-0	Thallium	4.5	4.0E-03	NA	NA	4E-03	NA	NA	4E-03	NA	NA	NA	4E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	6.2E-03	5E-04	2E-03	8E-03	4E-03	7E-04	8E-03	NA	NA	NA	4E-03

Table F-5-58. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Resident (Surface Soil)													
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Resident (Subsurface Soil)													
7440-36-0	Antimony	6.2	6E-02	NA	NA	6E-02	6E-02	6E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	1E-02	8E-11	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-28-0	Thallium	4.5	9E-01	NA	NA	9E-01	NA	NA	9E-01	NA	NA	NA	9E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	**1E+00**	1E-02	8E-11	**1E+00**	2E-01	6E-02	**1E+00**	NA	NA	NA	9E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-59. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Construction Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	6.2	NA	NA	NA	NA
7440-38-2	Arsenic	10	9E-07	5E-08	1E-08	9E-07
7440-28-0	Thallium	4.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	9E-07	5E-08	1E-08	9E-07

Table F-5-59. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	6.2	NA	NA	NA	NA
7440-38-2	Arsenic	10	4E-08	2E-09	6E-10	4E-08
7440-28-0	Thallium	4.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	4E-08	2E-09	6E-10	4E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-5-59. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	6.2	NA	NA	NA	NA
7440-38-2	Arsenic	10	3E-07	2E-08	5E-09	3E-07
7440-28-0	Thallium	4.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	3E-07	2E-08	5E-09	3E-07
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	6.2	NA	NA	NA	NA
7440-38-2	Arsenic	10	6E-07	2E-08	1E-08	6E-07
7440-28-0	Thallium	4.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	6E-07	2E-08	1E-08	6E-07
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-5-59. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the Futura Property

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	Not a COC	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	Not a COC	NA	NA	NA	NA
7440-43-9	Cadmium	Not a COC	NA	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	Not a COC	NA	NA	NA	NA
7440-02-0	Nickel	Not a COC	NA	NA	NA	NA
7782-49-2	Selenium	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	Not a COC	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	Not a COC	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Resident (Subsurface Soil)						
7440-36-0	Antimony	6.2	NA	NA	NA	NA
7440-38-2	Arsenic	10	2E-05	6E-09	9E-09	2E-05
7440-28-0	Thallium	4.5	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	2E-05	6E-09	9E-09	2E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Table F-5-60. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
																			Total HI_{ing} =	0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	0E+00
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-02
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	4E-01
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	6E-01

Table F-5-60. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =	0E+00

Table F-5-60. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	**(**	**EPC**	**x**	**IR_s**	**x**	**FI**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x (1 /**	**RfD_o**	**)) / (**	**BW**	**x**	**AT_{nc}**	**) =**	**HQ_{ing}**
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**		**kg**		**days**		**unitless**
CAS No.	**COC**																				
Road Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-38-2	Arsenic	(	9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-28-0	Thallium	(	4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																			Total HI_{ing} =		2E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =		0E+00
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	6.23E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	7E-04
7440-38-2	Arsenic	(	9.94E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-28-0	Thallium	(	4.48E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	4E-03
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																			Total HI_{ing} =		6E-03

Table F-5-60. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

		Equation:	**(EPC x IR_s x FI x CF x EF x ED x (1 / RfD_o)) / (BW x AT_{nc}) = HQ_{ing}**																				
		Units:	**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**			**kg**		**days**		**unitless**
CAS No.	**COC**																						
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																							
7440-36-0	Antimony		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	4.00E-04	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	3.00E-04	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	2.00E-01	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	1.00E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-47-3	Chromium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	3.00E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	5.00E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	2.00E-02	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	5.00E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	2.00E-05	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	3.00E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium		(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	(	1	/	5.04E-03	)	) / (	4.43E+01	x	3.29E+03	) =	NA
																								Total HI_{ing} =	0E+00

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable

Table F-5-61. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Construction Worker (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Construction Worker (Subsurface Soil)																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	9E-07

Table F-5-61. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Utility Worker (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Utility Worker (Subsurface Soil)																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	4E-08
Road Worker (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00

Table F-5-61. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Road Worker (Subsurface Soil)																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	3E-07
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(6.23E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7440-28-0	Thallium	(4.48E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-07

Table F-5-61. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Recreational User/Trespasser (Surface Soil)																				
7440-36-0	Antimony	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-62. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	(1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr			mg/kg-day		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	NA
7440-39-3	Barium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-01	)) /	9.49E+03	=	NA
7440-43-9	Cadmium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	1.00E-03	)) /	9.49E+03	=	NA
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7439-98-7	Molydenum	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	NA
7440-02-0	Nickel	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-02	)) /	9.49E+03	=	NA
7782-49-2	Selenium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	NA
7440-28-0	Thallium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7440-62-2	Vanadium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.04E-03	)) /	9.49E+03	=	NA
															Total HI_{ing} =		0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(6.23E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	6E-02
7440-38-2	Arsenic	(9.94E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	1E-01
7440-28-0	Thallium	(4.48E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	9E-01
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
															Total HI_{ing} =		**1E+00**

IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable.
Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-63. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the Futura Property

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	6.23E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	2E-05
7440-28-0	Thallium	(	4.48E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	2E-05

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable

Table F-5-64. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																				Total HI_{derm} =		0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{derm} =		0E+00
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{derm} =		8E-03

Table F-5-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00

Table F-5-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	0E+00
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	5E-04
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	5E-04

Table F-5-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(Not a COC	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	**(EPC**	**x SA**	**x AF**	**x ABS**	**x CF**	**x EF**	**x ED**	**x SF_d**	**) / (BW**	**x AT_c**	**) = CR_{derm}**
	Units:	**mg/kg**	**cm^2**	**mg/cm^2**	**unitless**	**kg/mg**	**days/yr**	**yr**	**$(mg/kg\text{-}day)^{-1}$**	**kg**	**days**	**unitless**
CAS No.	**COC**											
Industrial Worker (Surface Soil)												
7440-36-0	Antimony	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-38-2	Arsenic	(Not a COC	x 3.47E+03	x 1.20E-01	x 3.00E-02	x 1.00E-06	x 2.50E+02	x 2.50E+01	x 1.50E+00	) / (8.00E+01	x 2.56E+04	) = NA
7440-39-3	Barium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-43-9	Cadmium	(Not a COC	x 3.47E+03	x 1.20E-01	x 1.00E-03	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-47-3	Chromium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x 2.00E+01	) / (8.00E+01	x 2.56E+04	) = NA
7439-98-7	Molydenum	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-02-0	Nickel	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7782-49-2	Selenium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-28-0	Thallium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-61-1	Uranium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-62-2	Vanadium	(Not a COC	x 3.47E+03	x 1.20E-01	x ---	x 1.00E-06	x 2.50E+02	x 2.50E+01	x ---	) / (8.00E+01	x 2.56E+04	) = NA
											Total CR_{derm} =	0E+00
Construction Worker (Surface Soil)												
7440-36-0	Antimony	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-38-2	Arsenic	(Not a COC	x 3.47E+03	x 2.80E-01	x 3.00E-02	x 1.00E-06	x 2.50E+02	x 1.00E+00	x 1.50E+00	) / (8.00E+01	x 2.56E+04	) = NA
7440-39-3	Barium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-43-9	Cadmium	(Not a COC	x 3.47E+03	x 2.80E-01	x 1.00E-03	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-47-3	Chromium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x 2.00E+01	) / (8.00E+01	x 2.56E+04	) = NA
7439-98-7	Molydenum	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-02-0	Nickel	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7782-49-2	Selenium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-28-0	Thallium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-61-1	Uranium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-62-2	Vanadium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
											Total CR_{derm} =	0E+00
Construction Worker (Subsurface Soil)												
7440-36-0	Antimony	(6.23E+00	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-38-2	Arsenic	(9.94E+00	x 3.47E+03	x 2.80E-01	x 3.00E-02	x 1.00E-06	x 2.50E+02	x 1.00E+00	x 1.50E+00	) / (8.00E+01	x 2.56E+04	) = 5E-08
7440-28-0	Thallium	(4.48E+00	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
7440-61-1	Uranium	(Not a COC	x 3.47E+03	x 2.80E-01	x ---	x 1.00E-06	x 2.50E+02	x 1.00E+00	x ---	) / (8.00E+01	x 2.56E+04	) = NA
											Total CR_{derm} =	5E-08

Table F-5-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(	**EPC**	x	**SA**	x	**AF**	x	**ABS**	x	**CF**	x	**EF**	x	**ED**	x	**SF_d**	) / (	**BW**	x	**AT_c**	) =	**CR_{derm}**
	Units:		**mg/kg**		**cm^2**		**mg/cm^2**		**unitless**		**kg/mg**		**days/yr**		**yr**		**$(mg/kg\text{-}day)^{-1}$**		**kg**		**days**		**unitless**
CAS No.	**COC**																						
Utility Worker (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		0E+00
Utility Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	6.23E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.94E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-09
7440-28-0	Thallium	(	4.48E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		2E-09
Road Worker (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =		0E+00

Table F-5-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Road Worker (Subsurface Soil)																					
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-08
Maintenance Worker (Surface Soil)																					
7440-36-0	Antimony	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(Not a COC	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	0E+00
Maintenance Worker (Subsurface Soil)																					
7440-36-0	Antimony	(6.23E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.94E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(4.48E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-08

Table F-5-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

	Equation:	**(**	**EPC**	**x**	**SA**	**x**	**AF**	**x**	**ABS**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x**	**SF_d**	**) / (**	**BW**	**x**	**AT_c**	**) =**	**CR_{derm}**
	Units:		**mg/kg**		**cm^2**		**mg/cm^2**		**unitless**		**kg/mg**		**days/yr**		**yr**		**$(mg/kg\text{-}day)^{-1}$**		**kg**		**days**		**unitless**
CAS No.	**COC**																						
Recreational User/Trespasser (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-67. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura Property

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	(	1	/	RfD_d	)	)	/	AT_{nc}	)	=	HQ_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr					mg/kg-day				days			unitless
CAS No.	**COC**																						
Resident (Surface Soil)																							
7440-36-0	Antimony	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	6.00E-05	)	)	/	9.49E+03	)	=	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	)	=	NA
7440-39-3	Barium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	1.40E-02	)	)	/	9.49E+03	)	=	NA
7440-43-9	Cadmium	(	Not a COC	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	(	1	/	2.50E-05	)	)	/	9.49E+03	)	=	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	7.50E-05	)	)	/	9.49E+03	)	=	NA
7439-98-7	Molydenum	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	)	=	NA
7440-02-0	Nickel	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	8.00E-04	)	)	/	9.49E+03	)	=	NA
7782-49-2	Selenium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	5.00E-03	)	)	/	9.49E+03	)	=	NA
7440-28-0	Thallium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	)	=	NA
7440-62-2	Vanadium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	1.31E-04	)	)	/	9.49E+03	)	=	NA
																						Total HI_{derm} =	0E+00
Resident (Subsurface Soil)																							
7440-36-0	Antimony	(	6.23E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	6.00E-05	)	)	/	9.49E+03	)	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-04	)	)	/	9.49E+03	)	=	1E-02
7440-28-0	Thallium	(	4.48E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	2.00E-05	)	)	/	9.49E+03	)	=	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	(	1	/	3.00E-03	)	)	/	9.49E+03	)	=	NA
																						Total HI_{derm} =	1E-02

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-68. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the Futura

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	Not a COC	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	6.23E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.94E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	6E-09
7440-28-0	Thallium	(	4.48E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	6E-09

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-69. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	**=**	**(**	**(**	**SA_{s-cr}**	**x**	**AF_{s-cr}**	**x**	**ED_{cr}**	**)**	**/**	**BW_c**	**)**	**+**	**(**	**(**	**SA_{s-ar}**	**x**	**AF_{s-ar}**	**x**	**ED_{ar}**	**)**	**/**	**BW_a**	**)**
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-70. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}												
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	= NA
7440-38-2	Arsenic	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05	)) /	2.19E+05	= NA
7440-39-3	Barium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-04	)) /	2.19E+05	= NA
7440-43-9	Cadmium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05	)) /	2.19E+05	= NA
7440-47-3	Chromium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-04	)) /	2.19E+05	= NA
7439-98-7	Molydenum	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	= NA
7440-02-0	Nickel	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	9.00E-05	)) /	2.19E+05	= NA
7782-49-2	Selenium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) /	2.19E+05	= NA
7440-28-0	Thallium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	= NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-05	)) /	2.19E+05	= NA
7440-62-2	Vanadium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	= NA
															Total HI_{inh} =	0E+00
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7440-38-2	Arsenic	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	= NA
7440-39-3	Barium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	= NA
7440-43-9	Cadmium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7440-47-3	Chromium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7439-98-7	Molydenum	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7440-02-0	Nickel	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	= NA
7782-49-2	Selenium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7440-28-0	Thallium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	= NA
7440-62-2	Vanadium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	= NA
															Total HI_{inh} =	0E+00

Table F-5-70. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(6.23E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(9.94E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	2E-02
7440-28-0	Thallium	(4.48E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		2E-02
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-39-3	Barium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	NA
7440-43-9	Cadmium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	NA
7782-49-2	Selenium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		0E+00
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(6.23E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(9.94E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	6E-04
7440-28-0	Thallium	(4.48E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		6E-04

Table F-5-70. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	NA
7440-39-3	Barium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 5.00E-03)) /		8.76E+03	=	NA
7440-43-9	Cadmium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7439-98-7	Molydenum	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-02-0	Nickel	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 2.00E-04)) /		8.76E+03	=	NA
7782-49-2	Selenium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-28-0	Thallium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	NA
7440-62-2	Vanadium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
														Total HI_{inh} =		0E+00
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(6.23E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(9.94E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	5E-03
7440-28-0	Thallium	(4.48E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	NA
														Total HI_{inh} =		5E-03

Table F-5-70. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Maintenance Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	NA
7440-39-3	Barium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) /	5.78E+04	=	NA
7440-43-9	Cadmium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7439-98-7	Molydenum	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-02-0	Nickel	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) /	5.78E+04	=	NA
7782-49-2	Selenium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-28-0	Thallium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA
7440-62-2	Vanadium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
														Total HI_{inh} =		0E+00
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(6.23E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(9.94E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	2E-03
7440-28-0	Thallium	(4.48E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	NA
														Total HI_{inh} =		2E-03

Table F-5-70. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	**(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}**															
	Units:	**mg/kg**			**m^3/kg**		**hours/day**		**days/year**		**years**			**mg/m^3**			**hours**	**unitless**
CAS No.	**COC**																	
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																		
7440-36-0	Antimony	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	---	)) /	7.88E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	1.50E-05	)) /	7.88E+04	=	NA
7440-39-3	Barium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	5.00E-04	)) /	7.88E+04	=	NA
7440-43-9	Cadmium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	1.00E-05	)) /	7.88E+04	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	1.00E-04	)) /	7.88E+04	=	NA
7439-98-7	Molydenum	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	---	)) /	7.88E+04	=	NA
7440-02-0	Nickel	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	9.00E-05	)) /	7.88E+04	=	NA
7782-49-2	Selenium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	2.00E-02	)) /	7.88E+04	=	NA
7440-28-0	Thallium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	---	)) /	7.88E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	4.00E-05	)) /	7.88E+04	=	NA
7440-62-2	Vanadium	(Not a COC	x	(1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 /	---	)) /	7.88E+04	=	NA
																	Total HI_{inh} =	0E+00

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation not applicable

Table F-5-71. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Industrial Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)	)	/	6.13E+05	=	NA
																						Total CR_{inh} =		0E+00
Construction Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(	1 /	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																						Total CR_{inh} =		0E+00

Table F-5-71. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Construction Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	6.23E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	1E-08
7440-28-0	Thallium	(	4.48E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		1E-08
Utility Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00
Utility Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	6.23E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	6E-10
7440-28-0	Thallium	(	4.48E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		6E-10

Table F-5-71. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Road Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00
Road Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	6.23E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	5E-09
7440-28-0	Thallium	(	4.48E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		5E-09
Maintenance Worker (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =		0E+00

Table F-5-71. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(	EPC	x	CF	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
	Units:		mg/kg		µg/mg				m^3/kg			hours/day		days/year		years		$(µg/m^3)^{-1}$				hours		unitless
CAS No.	COC																							
Maintenance Worker (Subsurface Soil)																								
7440-36-0	Antimony	(	6.23E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	9.94E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)	)	/	6.13E+05	=	1E-08
7440-28-0	Thallium	(	4.48E+00	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.00E+07	)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	1E-08
Recreational User/Trespasser (Surface Soil)																								
7440-36-0	Antimony	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	NA
7440-39-3	Barium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	NA
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	NA
7439-98-7	Molydenum	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	NA
7782-49-2	Selenium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium	(	Not a COC	x	1.00E+03	x	(1	/	1.36E+09	)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)	)	/	6.13E+05	=	NA
																							Total CR_{inh} =	0E+00

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-72. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

	Equation:	(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x RfC)) / AT_{nc} = CR_{inh}																		
	Units:	mg/kg		µg/mg			m^3/kg		hours/day		days/year			years		years		mg/m^3		hours		unitless
CAS No.	**COC**																					
Resident (Surface Soil)																						
7440-36-0	Antimony	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	NA
7440-39-3	Barium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	5.00E-04	)) /	2.28E+05	=	NA
7440-43-9	Cadmium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-05	)) /	2.28E+05	=	NA
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-04	)) /	2.28E+05	=	NA
7439-98-7	Molydenum	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	9.00E-05	)) /	2.28E+05	=	NA
7782-49-2	Selenium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.00E-02	)) /	2.28E+05	=	NA
7440-28-0	Thallium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
7440-62-2	Vanadium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		0E+00	
Resident (Subsurface Soil)																						
7440-36-0	Antimony	(6.23E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(9.94E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	8E-11
7440-28-0	Thallium	(4.48E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	NA
																			Total HI_{inh} =		8E-11	

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-73. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the Futura Property

		Equation:	**(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x IUR)) / AT_c = CR_{inh}**																		
		Units:	**mg/kg**		**µg/mg**			**m^3/kg**		**hours/day**		**days/year**			**years**		**years**		**$(\mu g/m^3)^{-1}$**		**hours**	**unitless**
CAS No.	**COC**																				
Resident (Surface Soil)																					
7440-36-0	Antimony		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-38-2	Arsenic		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	= NA
7440-39-3	Barium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-43-9	Cadmium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	= NA
7440-47-3	Chromium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	= NA
7439-98-7	Molydenum		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-02-0	Nickel		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	= NA
7782-49-2	Selenium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-28-0	Thallium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-61-1	Uranium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-62-2	Vanadium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
																				Total CR_{inh} =	0E+00
Resident (Subsurface Soil)																					
7440-36-0	Antimony		(6.23E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-38-2	Arsenic		(9.94E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	= 9E-09
7440-28-0	Thallium		(4.48E+00	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
7440-61-1	Uranium		(Not a COC	x	1.00E+03	x	(1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	= NA
																				Total CR_{inh} =	9E-09

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-74. Surface Soil EPCs for Metal COCs at the Futura Property

CAS No.	COC	Surface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	Not a COC
7440-38-2	Arsenic	Not a COC
7440-39-3	Barium	Not a COC
7440-43-9	Cadmium	Not a COC
7440-47-3	Chromium	Not a COC
7439-98-7	Molydenum	Not a COC
7440-02-0	Nickel	Not a COC
7782-49-2	Selenium	Not a COC
7440-28-0	Thallium	Not a COC
7440-61-1	Uranium	Not a COC
7440-62-2	Vanadium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c).

Table F-5-75. Subsurface Soil EPCs for Metal COCs at the Futura Property

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	6.2
7440-38-2	Arsenic	9.9
7440-28-0	Thallium	4.5
7440-61-1	Uranium	Not a COC

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (USACE 2013c).

Table F-5-76. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)[1]			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Dermal Slope Factor[c] $(mg/kg\text{-}day)^{-1}$	IUR $(\mu g/m^3)^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the IUR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surroga calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-5-77. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Combined Latty Avenue Properties (HISS, Parcel 10K530087, VP-02[L], and Futura)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	15	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	4E-02	9E-03	4E-02	8E-02	8E-02	NA	8E-02	NA	NA	NA	NA
7440-39-3	Barium	151	3E-04	NA	7E-03	7E-03	7E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	4E-04	1E-04	2E-03	2E-03	NA	2E-03	NA	2E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	16	3E-04	NA	4E-03	4E-03	NA	4E-03	NA	NA	NA	4E-03	NA
7782-49-2	Selenium	1.6	1E-04	NA	NA	1E-04	NA	NA	1E-04	NA	NA	NA	1E-04
7440-28-0	Thallium	5.1	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	2E-01	9E-03	5E-02	2E-01	1E-01	3E-02	2E-01	2E-03	2E-04	4E-03	1E-01
Construction Worker (Surface Soil)													
7440-36-0	Antimony	15	2E-01	NA	NA	2E-01	2E-01	2E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	3E-01	2E-02	4E-02	4E-01	4E-01	NA	4E-01	NA	NA	NA	NA
7440-39-3	Barium	151	3E-03	NA	7E-04	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	4E-03	6E-04	NA	4E-03	NA	4E-03	NA	4E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	16	3E-03	NA	2E-03	5E-03	NA	5E-03	NA	NA	NA	5E-03	NA
7782-49-2	Selenium	1.6	1E-03	NA	NA	1E-03	NA	NA	1E-03	NA	NA	NA	1E-03
7440-28-0	Thallium	5.1	4E-01	NA	NA	4E-01	NA	NA	4E-01	NA	NA	NA	4E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	1E+00	2E-02	4E-02	**1E+00**	6E-01	2E-01	8E-01	4E-03	2E-03	5E-03	4E-01
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	10	1E-01	NA	NA	1E-01	1E-01	1E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	8E-03	2E-02	2E-01	2E-01	NA	2E-01	NA	NA	NA	NA
7440-28-0	Thallium	3.7	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	6E-01	8E-03	2E-02	6E-01	3E-01	1E-01	5E-01	NA	NA	NA	3E-01

Table F-5-77. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Combined Latty Avenue Properties (HISS, Parcel 10K530087, VP-02[L], and Futura)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	15	6E-03	NA	NA	6E-03	6E-03	6E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	1E-02	8E-04	2E-03	2E-02	2E-02	NA	2E-02	NA	NA	NA	NA
7440-39-3	Barium	151	1E-04	NA	3E-05	2E-04	2E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	1E-04	2E-05	NA	2E-04	NA	2E-04	NA	2E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	8E-05	NA	NA	8E-05	NA	NA	NA	NA	8E-05	NA	NA
7440-02-0	Nickel	16	1E-04	NA	7E-05	2E-04	NA	2E-04	NA	NA	NA	2E-04	NA
7782-49-2	Selenium	1.6	5E-05	NA	NA	5E-05	NA	NA	5E-05	NA	NA	NA	5E-05
7440-28-0	Thallium	5.1	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	7E-04	NA	NA	7E-04	NA	7E-04	NA	NA	NA	NA	NA
		Total HIs:	4E-02	9E-04	2E-03	4E-02	2E-02	7E-03	3E-02	2E-04	8E-05	2E-04	2E-02
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	10	4E-03	NA	NA	4E-03	4E-03	4E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	6E-03	3E-04	6E-04	7E-03	7E-03	NA	7E-03	NA	NA	NA	NA
7440-28-0	Thallium	3.7	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-02	3E-04	6E-04	2E-02	1E-02	4E-03	2E-02	NA	NA	NA	1E-02
Road Worker (Surface Soil)													
7440-36-0	Antimony	15	6E-02	NA	NA	6E-02	6E-02	6E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	1E-01	7E-03	1E-02	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-39-3	Barium	151	1E-03	NA	2E-04	1E-03	1E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	1E-03	2E-04	NA	1E-03	NA	1E-03	NA	1E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	7E-04	NA	NA	7E-04	NA	NA	NA	NA	7E-04	NA	NA
7440-02-0	Nickel	16	1E-03	NA	7E-04	2E-03	NA	2E-03	NA	NA	NA	2E-03	NA
7782-49-2	Selenium	1.6	5E-04	NA	NA	5E-04	NA	NA	5E-04	NA	NA	NA	5E-04
7440-28-0	Thallium	5.1	2E-01	NA	NA	2E-01	NA	NA	2E-01	NA	NA	NA	2E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	7E-03	NA	NA	7E-03	NA	7E-03	NA	NA	NA	NA	NA
		Total HIs:	3E-01	8E-03	1E-02	4E-01	2E-01	7E-02	3E-01	1E-03	7E-04	2E-03	2E-01

Table F-5-77. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Combined Latty Avenue Properties (HISS, Parcel 10K530087, VP-02[L], and Futura)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	10	4E-02	NA	NA	4E-02	4E-02	4E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	5E-02	3E-03	6E-03	6E-02	6E-02	NA	6E-02	NA	NA	NA	NA
7440-28-0	Thallium	3.7	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	2E-01	3E-03	6E-03	2E-01	1E-01	4E-02	2E-01	NA	NA	NA	1E-01
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	15	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	4E-02	1E-03	4E-03	4E-02	4E-02	NA	4E-02	NA	NA	NA	NA
7440-39-3	Barium	151	3E-04	NA	7E-05	4E-04	4E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	7E-04	3E-05	NA	8E-04	NA	8E-04	NA	8E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	16	3E-04	NA	2E-04	5E-04	NA	5E-04	NA	NA	NA	5E-04	NA
7782-49-2	Selenium	1.6	1E-04	NA	NA	1E-04	NA	NA	1E-04	NA	NA	NA	1E-04
7440-28-0	Thallium	5.1	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	1E-01	1E-03	4E-03	1E-01	6E-02	2E-02	8E-02	8E-04	2E-04	5E-04	4E-02
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	10	1E-03	NA	NA	1E-03	1E-03	1E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	2E-03	5E-04	2E-03	4E-03	4E-03	NA	4E-03	NA	NA	NA	NA
7440-28-0	Thallium	3.7	3E-03	NA	NA	3E-03	NA	NA	3E-03	NA	NA	NA	3E-03
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	6E-03	5E-04	2E-03	8E-03	5E-03	1E-03	7E-03	NA	NA	NA	3E-03

Table F-5-77. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at Combined Latty Avenue Properties (HISS, Parcel 10K530087, VP-02[L], and Futura)

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	15	3E-03	NA	NA	3E-03	3E-03	3E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	7E-03	3E-03	7E-06	1E-02	1E-02	NA	1E-02	NA	NA	NA	NA
7440-39-3	Barium	151	6E-05	NA	1E-06	6E-05	6E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	7E-05	4E-05	4E-07	1E-04	NA	1E-04	NA	1E-04	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	4E-05	NA	NA	4E-05	NA	NA	NA	NA	4E-05	NA	NA
7440-02-0	Nickel	16	7E-05	NA	8E-07	7E-05	NA	7E-05	NA	NA	NA	7E-05	NA
7782-49-2	Selenium	1.6	3E-05	NA	NA	3E-05	NA	NA	3E-05	NA	NA	NA	3E-05
7440-28-0	Thallium	5.1	2E-02	NA	NA	2E-02	NA	NA	2E-02	NA	NA	NA	2E-02
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	4E-04	NA	NA	4E-04	NA	4E-04	NA	NA	NA	NA	NA
		Total HIs:	3E-02	3E-03	1E-05	3E-02	1E-02	4E-03	3E-02	1E-04	4E-05	7E-05	2E-02
Resident (Surface Soil)													
7440-36-0	Antimony	15	1E-01	NA	NA	1E-01	1E-01	1E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	3E-01	3E-02	2E-10	4E-01	4E-01	NA	4E-01	NA	NA	NA	NA
7440-39-3	Barium	151	3E-03	NA	5E-08	3E-03	3E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	3E-03	4E-04	5E-12	4E-03	NA	4E-03	NA	4E-03	NA	NA	NA
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	16	3E-03	NA	9E-10	3E-03	NA	3E-03	NA	NA	NA	3E-03	NA
7782-49-2	Selenium	1.6	1E-03	NA	NA	1E-03	NA	NA	1E-03	NA	NA	NA	1E-03
7440-28-0	Thallium	5.1	1E+00	NA	NA	1E+00	NA	NA	1E+00	NA	NA	NA	1E+00
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-62-2	Vanadium	23	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	**1E+00**	3E-02	5E-08	**2E+00**	5E-01	2E-01	**1E+00**	4E-03	2E-03	3E-03	1E+00
Resident (Subsurface Soil)													
7440-36-0	Antimony	10	1E-01	NA	NA	1E-01	1E-01	1E-01	NA	NA	NA	NA	NA
7440-38-2	Arsenic	10	1E-01	1E-02	9E-11	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-28-0	Thallium	3.7	7E-01	NA	NA	7E-01	NA	NA	7E-01	NA	NA	NA	7E-01
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Total HIs:	1E+00	1E-02	9E-11	1E+00	2E-01	1E-01	9E-01	NA	NA	NA	7E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-78. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	6E-06	1E-06	9E-07	8E-06
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	1E-08	1E-08
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	3E-08	3E-08
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	6E-06	1E-06	9E-07	8E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	2E-06	1E-07	3E-08	2E-06
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	5E-10	5E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	1E-09	1E-09
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	2E-06	1E-07	4E-08	2E-06
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	10	NA	NA	NA	NA
7440-38-2	Arsenic	10	9E-07	5E-08	1E-08	1E-06
7440-28-0	Thallium	3.7	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	9E-07	5E-08	1E-08	1E-06

Table F-5-78. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	9E-08	5E-09	1E-09	9E-08
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	2E-11	2E-11
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	6E-11	6E-11
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	9E-08	5E-09	1E-09	9E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	10	NA	NA	NA	NA
7440-38-2	Arsenic	10	4E-08	2E-09	6E-10	4E-08
7440-28-0	Thallium	3.7	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	4E-08	2E-09	6E-10	4E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	8E-07	5E-08	1E-08	8E-07
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	2E-10	2E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	5E-10	5E-10
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	8E-07	5E-08	1E-08	8E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	10	NA	NA	NA	NA
7440-38-2	Arsenic	10	3E-07	2E-08	5E-09	3E-07
7440-28-0	Thallium	3.7	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	3E-07	2E-08	5E-09	3E-07

Table F-5-78. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	2E-06	5E-08	2E-08	2E-06
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	4E-10	4E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	9E-10	9E-10
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	2E-06	5E-08	3E-08	2E-06
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	10	NA	NA	NA	NA
7440-38-2	Arsenic	10	6E-07	2E-08	1E-08	6E-07
7440-28-0	Thallium	3.7	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	6E-07	2E-08	1E-08	6E-07
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	4E-07	2E-07	6E-11	6E-07
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	9E-13	9E-13
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	2E-12	2E-12
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	4E-07	2E-07	6E-11	6E-07

Table F-5-78. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	15	NA	NA	NA	NA
7440-38-2	Arsenic	24.9	5E-05	1E-08	2E-08	5E-05
7440-39-3	Barium	151	NA	NA	NA	NA
7440-43-9	Cadmium	0.9	NA	NA	3E-10	3E-10
7440-47-3	Chromium	Not a COC	NA	NA	NA	NA
7439-98-7	Molydenum	2.3	NA	NA	NA	NA
7440-02-0	Nickel	16	NA	NA	8E-10	8E-10
7782-49-2	Selenium	1.6	NA	NA	NA	NA
7440-28-0	Thallium	5.1	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
7440-62-2	Vanadium	23	NA	NA	NA	NA
		Total CRs:	5E-05	1E-08	2E-08	5E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	10	NA	NA	NA	NA
7440-38-2	Arsenic	10	2E-05	6E-09	9E-09	2E-05
7440-28-0	Thallium	3.7	NA	NA	NA	NA
7440-61-1	Uranium	Not a COC	NA	NA	NA	NA
		Total CRs:	2E-05	6E-09	9E-09	2E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Table F-5-79. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	)	=	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days			unitless
CAS No.	**COC**																				
Industrial Worker (Surface Soil) - Chronic Exposures																					
7440-36-0	Antimony	1.54E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	)	=	2E-02
7440-38-2	Arsenic	2.49E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	)	=	4E-02
7440-39-3	Barium	1.51E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	)	=	3E-04
7440-43-9	Cadmium	8.71E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	)	=	4E-04
7440-47-3	Chromium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	)	=	NA
7439-98-7	Molydenum	2.34E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	)	=	2E-04
7440-02-0	Nickel	1.62E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	)	=	3E-04
7782-49-2	Selenium	1.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	)	=	1E-04
7440-28-0	Thallium	5.11E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	)	=	1E-01
7440-61-1	Uranium	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	)	=	NA
7440-62-2	Vanadium	2.28E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	)	=	2E-03
																				Total HI_{ing} =	2E-01
Construction Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	2E-01
7440-38-2	Arsenic	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	3E-01
7440-39-3	Barium	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	)	=	3E-03
7440-43-9	Cadmium	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	4E-03
7440-47-3	Chromium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7439-98-7	Molydenum	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	2E-03
7440-02-0	Nickel	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	)	=	3E-03
7782-49-2	Selenium	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	1E-03
7440-28-0	Thallium	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	4E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7440-62-2	Vanadium	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	)	=	2E-02
																				Total HI_{ing} =	1E+00
Construction Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	1E-01
7440-38-2	Arsenic	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	1E-01
7440-28-0	Thallium	3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	3E-01
7440-61-1	Uranium	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
																				Total HI_{ing} =	6E-01

Table F-5-79. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	)	=	HQ_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days			unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	6E-03
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	1E-02
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	)	=	1E-04
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	1E-04
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	8E-05
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	)	=	1E-04
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	5E-05
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	2E-02
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	)	=	7E-04
																					Total HI_{ing} =	4E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	4E-03
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	6E-03
7440-28-0	Thallium	(	3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	1E-02
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
																					Total HI_{ing} =	2E-02
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	6E-02
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	1E-01
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	)	=	1E-03
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	1E-03
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	7E-04
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	)	=	1E-03
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	)	=	5E-04
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	2E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	)	=	7E-03
																					Total HI_{ing} =	3E-01

Table F-5-79. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	)	=	HQ_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days			unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	4E-02
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	5E-02
7440-28-0	Thallium	(	3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	)	=	1E-01
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	)	=	NA
																					Total HI_{ing} =	2E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	2E-02
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	4E-02
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	)	=	3E-04
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	7E-04
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	)	=	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	)	=	2E-04
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	)	=	3E-04
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	)	=	1E-04
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	)	=	4E-02
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	)	=	2E-03
																					Total HI_{ing} =	1E-01
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(	1.05E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	1E-03
7440-38-2	Arsenic	(	1.02E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	2E-03
7440-28-0	Thallium	(	3.73E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	)	=	3E-03
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	)	=	NA
																					Total HI_{ing} =	6E-03

Table F-5-79. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	)	=	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days			unitless
CAS No.	COC																				
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																					
7440-36-0	Antimony	(1.54E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	)	=	3E-03
7440-38-2	Arsenic	(2.49E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	)	=	7E-03
7440-39-3	Barium	(1.51E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	)	=	6E-05
7440-43-9	Cadmium	(8.71E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	)	=	7E-05
7440-47-3	Chromium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	)	=	NA
7439-98-7	Molydenum	(2.34E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	)	=	4E-05
7440-02-0	Nickel	(1.62E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	)	=	7E-05
7782-49-2	Selenium	(1.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	)	=	3E-05
7440-28-0	Thallium	(5.11E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	)	=	2E-02
7440-61-1	Uranium	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	)	=	NA
7440-62-2	Vanadium	(2.28E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	)	=	4E-04
																				Total HI_{ing} =	3E-02

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable

Table F-5-80. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-06
7440-39-3	Barium	(	1.51E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	6E-06
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-06
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	2E-06
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7440-28-0	Thallium	(	3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	9E-07

Table F-5-80. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	9E-08
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	9E-08
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-28-0	Thallium	(	3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-08
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	8E-07
7440-39-3	Barium	(	1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	8E-07

Table F-5-80. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Road Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7440-28-0	Thallium	(3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	3E-07
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(1.54E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-06
7440-39-3	Barium	(1.51E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	2E-06
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.05E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7440-28-0	Thallium	(3.73E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-07

Table F-5-80. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Recreational User/Trespasser (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	4E-07
7440-39-3	Barium	(	1.51E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-07

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-81. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	(1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr			mg/kg-day		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(1.54E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	1E-01
7440-38-2	Arsenic	(2.49E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	3E-01
7440-39-3	Barium	(1.51E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-01	)) /	9.49E+03	=	3E-03
7440-43-9	Cadmium	(8.71E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	1.00E-03	)) /	9.49E+03	=	3E-03
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	2E-03
7440-02-0	Nickel	(1.62E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-02	)) /	9.49E+03	=	3E-03
7782-49-2	Selenium	(1.60E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	1E-03
7440-28-0	Thallium	(5.11E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	1E+00
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.04E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =		**1E+00**
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(1.05E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	1E-01
7440-38-2	Arsenic	(1.02E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	1E-01
7440-28-0	Thallium	(3.73E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	7E-01
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	NA
															Total HI_{ing} =		1E+00

"---" - Value not available
IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{ing} - Hazard quotient for individual COC from soil ingestion
HI_{ing} - Hazard index summed over individual HQs from soil ingestion
NA - HQ calculation is not applicable
Bold/shading - HQ or HI exceeds the USEPA's target value of 1

Table F-5-82. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(1.54E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	5E-05
7440-39-3	Barium	(1.51E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(1.60E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
															Total CR =	5E-05
Resident (Subsurface Soil)																
7440-36-0	Antimony	(1.05E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	2E-05
7440-28-0	Thallium	(3.73E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
															Total CR =	2E-05

"---" - Value not available
IFS_{adj} - Age-adjusted soil ingestion factor
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable

Table F-5-83. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	$IR_{s\text{-}cr}$	x	ED_{cr}	) /	BW_c	) + ((	$IR_{s\text{-}ar}$	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
$IR_{s\text{-}cr}$ - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
$IR_{s\text{-}ar}$ - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-84. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	9E-03
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-04
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																					Total HI_{derm} =	9E-03
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-02
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	8E-03

Table F-5-84. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-05
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	9E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	8E-03

Table F-5-84. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-28-0	Thallium	3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.54E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	2.49E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-39-3	Barium	1.51E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	8.71E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	3E-05
7440-47-3	Chromium	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	2.34E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	1.62E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	1.60E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	5.11E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	2.28E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	1E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.05E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	1.02E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	5E-04
7440-28-0	Thallium	3.73E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	5E-04

Table F-5-84. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(1.54E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	3E-03
7440-39-3	Barium	(1.51E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	4E-05
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(1.62E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(1.60E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(5.11E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	3E-03

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-85. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	1E-06
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	1E-06
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	1E-07
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	1E-07
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	5E-08
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	5E-08

Table F-5-85. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	5E-09
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	5E-09
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	2E-09
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-09
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	5E-08
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	5E-08

Table F-5-85. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Road Worker (Subsurface Soil)																					
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-08
Maintenance Worker (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	5E-08
7440-39-3	Barium	(1.51E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	5E-08
Maintenance Worker (Subsurface Soil)																					
7440-36-0	Antimony	(1.05E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	2E-08
7440-28-0	Thallium	(3.73E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-08

Table F-5-85. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Recreational User/Trespasser (Surface Soil)																					
7440-36-0	Antimony	(1.54E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (4.43E+01	x	2.56E+04	) =	2E-07
7440-39-3	Barium	(1.51E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.62E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(1.60E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.11E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(Not a COC	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =	2E-07

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-86. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x (1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(1.54E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(2.49E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	3E-02
7440-39-3	Barium	(1.51E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(8.71E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x (1 /	2.50E-05	)) /	9.49E+03	) =	4E-04
7440-47-3	Chromium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(2.34E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(1.62E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(1.60E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(5.11E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(2.28E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.31E-04	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	3E-02
Resident (Subsurface Soil)																
7440-36-0	Antimony	(1.05E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(1.02E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	1E-02
7440-28-0	Thallium	(3.73E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	1E-02

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable

Table F-5-87. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
	Units:		mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	1.54E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	2.49E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	1E-08
7440-39-3	Barium	(	1.51E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	8.71E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.34E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.62E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	1.60E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.11E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.28E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	1E-08
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	1.05E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	1.02E+01	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	6E-09
7440-28-0	Thallium	(	3.73E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	Not a COC	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	6E-09

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable

Table F-5-88. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	**=**	**(**	**(**	**SA_{s-cr}**	**x**	**AF_{s-cr}**	**x**	**ED_{cr}**	**)**	**/**	**BW_c**	**)**	**+**	**(**	**(**	**SA_{s-ar}**	**x**	**AF_{s-ar}**	**x**	**ED_{ar}**	**)**	**/**	**BW_a**	**)**
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-5-89. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

		Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
		Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC																
Industrial Worker (Surface Soil) - Chronic Exposures																	
7440-36-0	Antimony		1.54E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-38-2	Arsenic		2.49E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05	)) /	2.19E+05	=	4E-02
7440-39-3	Barium		1.51E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-04	)) /	2.19E+05	=	7E-03
7440-43-9	Cadmium		8.71E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05	)) /	2.19E+05	=	2E-03
7440-47-3	Chromium		Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-04	)) /	2.19E+05	=	NA
7439-98-7	Molydenum		2.34E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-02-0	Nickel		1.62E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	9.00E-05	)) /	2.19E+05	=	4E-03
7782-49-2	Selenium		1.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-28-0	Thallium		5.11E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-61-1	Uranium		Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-05	)) /	2.19E+05	=	NA
7440-62-2	Vanadium		2.28E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
															Total HI_{inh} =		5E-02
Construction Worker (Surface Soil) - Subchronic Exposures																	
7440-36-0	Antimony		1.54E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic		2.49E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	4E-02
7440-39-3	Barium		1.51E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	7E-04
7440-43-9	Cadmium		8.71E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium		Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum		2.34E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel		1.62E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	2E-03
7782-49-2	Selenium		1.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium		5.11E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium		Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium		2.28E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
															Total HI_{inh} =		4E-02

Table F-5-89. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	(1 / PEF)	x	ET	x	EF	x	ED	x	(1 / RfC)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3	hours		unitless
CAS No.	COC														
Construction Worker (Subsurface Soil) - Subchronic Exposures															
7440-36-0	Antimony	(1.05E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.50E-05)) /	8.76E+03	=	2E-02
7440-28-0	Thallium	(3.73E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.00E-04)) /	8.76E+03	=	NA
													Total HI_{inh} =		2E-02
Utility Worker (Surface Soil) - Subchronic Exposures															
7440-36-0	Antimony	(1.54E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(2.49E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /	8.76E+03	=	2E-03
7440-39-3	Barium	(1.51E+02	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 5.00E-03)) /	8.76E+03	=	3E-05
7440-43-9	Cadmium	(8.71E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(2.34E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.62E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 2.00E-04)) /	8.76E+03	=	7E-05
7782-49-2	Selenium	(1.60E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-28-0	Thallium	(5.11E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.28E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
													Total HI_{inh} =		2E-03
Utility Worker (Subsurface Soil) - Subchronic Exposures															
7440-36-0	Antimony	(1.05E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /	8.76E+03	=	6E-04
7440-28-0	Thallium	(3.73E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / ---)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /	8.76E+03	=	NA
													Total HI_{inh} =		6E-04

Table F-5-89. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.54E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(2.49E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	1E-02
7440-39-3	Barium	(1.51E+02	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	2E-04
7440-43-9	Cadmium	(8.71E-01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(2.34E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.62E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	7E-04
7782-49-2	Selenium	(1.60E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(5.11E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
7440-62-2	Vanadium	(2.28E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		1E-02
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.05E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(1.02E+01	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	6E-03
7440-28-0	Thallium	(3.73E+00	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	NA
														Total HI_{inh} =		6E-03

Table F-5-89. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	**(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}**																
	Units:	**mg/kg**			**m^3/kg**		**hours/day**		**days/year**		**years**			**mg/m^3**			**hours**	**unitless**
CAS No.	**COC**																	
Maintenance Worker (Surface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(1.54E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(2.49E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	1.50E-05	)) /	5.78E+04	=	4E-03
7440-39-3	Barium	(1.51E+02	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	5.00E-03	)) /	5.78E+04	=	7E-05
7440-43-9	Cadmium	(8.71E-01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-47-3	Chromium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7439-98-7	Molydenum	(2.34E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-02-0	Nickel	(1.62E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	2.00E-04	)) /	5.78E+04	=	2E-04
7782-49-2	Selenium	(1.60E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-28-0	Thallium	(5.11E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	1.00E-04	)) /	5.78E+04	=	NA
7440-62-2	Vanadium	(2.28E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
																Total HI_{inh} =		4E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																		
7440-36-0	Antimony	(1.05E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(1.02E+01	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	1.50E-05	)) /	5.78E+04	=	2E-03
7440-28-0	Thallium	(3.73E+00	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(Not a COC	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 /	1.00E-04	)) /	5.78E+04	=	NA
																Total HI_{inh} =		2E-03

Table F-5-89. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x (1 / PEF)	x ET	x EF	x ED	x (1 / RfC)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg	m^3/kg	hours/day	days/year	years	mg/m^3	hours		unitless
CAS No.	COC									
Recreational User/Trespasser (Surface Soil) - Chronic Exposures										
7440-36-0	Antimony	1.54E+01	1.36E+09	2.00E+00	2.60E+01	9.00E+00	---	7.88E+04	=	NA
7440-38-2	Arsenic	2.49E+01	1.36E+09	2.00E+00	2.60E+01	9.00E+00	1.50E-05	7.88E+04	=	7E-06
7440-39-3	Barium	1.51E+02	1.36E+09	2.00E+00	2.60E+01	9.00E+00	5.00E-04	7.88E+04	=	1E-06
7440-43-9	Cadmium	8.71E-01	1.36E+09	2.00E+00	2.60E+01	9.00E+00	1.00E-05	7.88E+04	=	4E-07
7440-47-3	Chromium	Not a COC	1.36E+09	2.00E+00	2.60E+01	9.00E+00	1.00E-04	7.88E+04	=	NA
7439-98-7	Molydenum	2.34E+00	1.36E+09	2.00E+00	2.60E+01	9.00E+00	---	7.88E+04	=	NA
7440-02-0	Nickel	1.62E+01	1.36E+09	2.00E+00	2.60E+01	9.00E+00	9.00E-05	7.88E+04	=	8E-07
7782-49-2	Selenium	1.60E+00	1.36E+09	2.00E+00	2.60E+01	9.00E+00	---	7.88E+04	=	NA
7440-28-0	Thallium	5.11E+00	1.36E+09	2.00E+00	2.60E+01	9.00E+00	---	7.88E+04	=	NA
7440-61-1	Uranium	Not a COC	1.36E+09	2.00E+00	2.60E+01	9.00E+00	4.00E-05	7.88E+04	=	NA
7440-62-2	Vanadium	2.28E+01	1.36E+09	2.00E+00	2.60E+01	9.00E+00	---	7.88E+04	=	NA
								Total HI_{inh} =		1E-05

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation is not applicable

Table F-5-90. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Industrial Worker (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)) /	6.13E+05	=	9E-07
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)) /	6.13E+05	=	1E-08
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)) /	6.13E+05	=	3E-08
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	9E-07
Construction Worker (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	3E-08
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	5E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	4E-08

Table F-5-90. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Construction Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.05E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-28-0	Thallium	(3.73E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Utility Worker (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-09
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-11
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	6E-11
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-09
Utility Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.05E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	6E-10
7440-28-0	Thallium	(3.73E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-10

Table F-5-90. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	5E-10
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.05E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	5E-09
7440-28-0	Thallium	(3.73E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	5E-09
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	2E-08
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	4E-10
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	9E-10
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	3E-08

Table F-5-90. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Maintenance Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.05E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(1.02E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	1E-08
7440-28-0	Thallium	(3.73E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-08
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(1.54E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(2.49E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	6E-11
7440-39-3	Barium	(1.51E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(8.71E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	9E-13
7440-47-3	Chromium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.34E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.62E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	2E-12
7782-49-2	Selenium	(1.60E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.11E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.28E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-11

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-91. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(EPC x CF (1 / PEF) x ET x EF) x (ED_{cr} + ED_{ar}) x RfC)) / AT_c = CR_{inh}
	Units:	mg/kg µg/mg m^3/kg hours/day days/year years years mg/m^3 hours unitless
CAS No.	**COC**	
Resident (Surface Soil)		
7440-36-0	Antimony	(1.54E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.00E+01) x ---)) / 2.28E+05 = NA
7440-38-2	Arsenic	(2.49E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 1.50E-05)) / 2.28E+05 = 2E-10
7440-39-3	Barium	(1.51E+02 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 5.00E-04)) / 2.28E+05 = 5E-08
7440-43-9	Cadmium	(8.71E-01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 1.00E-05)) / 2.28E+05 = 5E-12
7440-47-3	Chromium	(Not a COC x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 1.00E-04)) / 2.28E+05 = NA
7439-98-7	Molydenum	(2.34E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
7440-02-0	Nickel	(1.62E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 9.00E-05)) / 2.28E+05 = 9E-10
7782-49-2	Selenium	(1.60E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
7440-28-0	Thallium	(5.11E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
7440-61-1	Uranium	(Not a COC x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 4.00E-05)) / 2.28E+05 = NA
7440-62-2	Vanadium	(2.28E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
		Total HI_{inh} = 5E-08
Resident (Subsurface Soil)		
7440-36-0	Antimony	(1.05E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
7440-38-2	Arsenic	(1.02E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 1.50E-05)) / 2.28E+05 = 9E-11
7440-28-0	Thallium	(3.73E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x ---)) / 2.28E+05 = NA
7440-61-1	Uranium	(Not a COC x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02) x (6.00E+00 + 2.40E+01) x 4.00E-05)) / 2.28E+05 = NA
		Total HI_{inh} = 9E-11

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - HQ calculation is not applicable

Table F-5-92. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at Latty Avenue Properties (Combined Using Equally Weighted EPCs)

	Equation:	(	EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	IUR	)) /	AT_c	=	CR_{inh}
	Units:		mg/kg		μg/mg		m^3/kg		hours/day		days/year		years		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																				
Resident (Surface Soil)																					
7440-36-0	Antimony	(	1.54E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(	2.49E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	2E-08
7440-39-3	Barium	(	1.51E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(	8.71E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	3E-10
7440-47-3	Chromium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	8.40E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(	2.34E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(	1.62E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	8E-10
7782-49-2	Selenium	(	1.60E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(	5.11E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(	2.28E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =		2E-08
Resident (Subsurface Soil)																					
7440-36-0	Antimony	(	1.05E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(	1.02E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	9E-09
7440-28-0	Thallium	(	3.73E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =		9E-09

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable

Table F-5-93. Surface Soil EPCs for Metal COCs at Latty Avenue Properties (Combined Using Equal Weighting Across Properties)

CAS No.	COC	Surface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	15.39
7440-38-2	Arsenic	24.86
7440-39-3	Barium	150.6
7440-43-9	Cadmium	0.871
7440-47-3	Chromium	Not a COC
7439-98-7	Molydenum	2.343
7440-02-0	Nickel	16.24
7782-49-2	Selenium	1.603
7440-28-0	Thallium	5.111
7440-61-1	Uranium	Not a COC
7440-62-2	Vanadium	22.84

[a] EPCs calculated from data presented in the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L)* (USACE 2012h).

Table F-5-94. Subsurface Soil EPCs for Metal COCs at Latty Avenue Properties (Combined Using Equal Weighting Across Properties)

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a]
7440-36-0	Antimony	10.49
7440-38-2	Arsenic	10.15
7440-28-0	Thallium	3.734
7440-61-1	Uranium	Not a COC

[a] EPCs calculated from data presented in the *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property 02(L)* (USACE 2012h).

Table F-5-95. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	8.40E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the IUR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

ATTACHMENT F-6

METALS RISK ASSESSMENT CALCULATIONS FOR THE ST. LOUIS AIRPORT SITE AND INVESTIGATIONAL AREA 13 WORKER, RECREATIONAL USER/TRESPASSER, AND RESIDENTIAL SCENARIOS

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CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	1	1E-03	NA	NA	1E-03	1E-03	1E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	5E-04	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	3E-03	1E-03	2E-02	2E-02	NA	2E-02	NA	2E-02	NA	NA	NA
7440-47-3	Chromium	19	3E-03	NA	4E-03	7E-03	NA	7E-03	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	23	5E-04	NA	6E-03	6E-03	NA	6E-03	NA	NA	NA	6E-03	NA
7782-49-2	Selenium	4	3E-04	NA	5E-06	3E-04	NA	NA	3E-04	NA	NA	NA	3E-04
7440-28-0	Thallium	2	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	15	2E-03	NA	9E-03	1E-02	NA	NA	NA	1E-02	NA	NA	NA
7440-62-2	Vanadium	29	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	5E-02	1E-03	5E-02	1E-01	1E-02	4E-02	4E-02	3E-02	2E-04	6E-03	4E-02
Construction Worker (Surface Soil)													
7440-36-0	Antimony	1	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	5E-03	NA	1E-03	6E-03	6E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	3E-02	5E-03	NA	3E-02	NA	3E-02	NA	3E-02	NA	NA	NA
7440-47-3	Chromium	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	23	5E-03	NA	3E-03	7E-03	NA	7E-03	NA	NA	NA	7E-03	NA
7782-49-2	Selenium	4	3E-03	NA	NA	3E-03	NA	NA	3E-03	NA	NA	NA	3E-03
7440-28-0	Thallium	2	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	15	3E-01	NA	3E-03	3E-01	NA	NA	NA	3E-01	NA	NA	NA
7440-62-2	Vanadium	29	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	5E-01	5E-03	7E-03	5E-01	2E-02	8E-02	1E-01	3E-01	2E-03	7E-03	1E-01
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	1	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	2	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	15	3E-01	NA	3E-03	3E-01	NA	NA	NA	3E-01	NA	NA	NA
		Total HIs:	5E-01	NA	3E-03	5E-01	1E-02	1E-02	1E-01	3E-01	NA	NA	1E-01

Table F-6-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	1	6E-04	NA	NA	6E-04	6E-04	6E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	2E-04	NA	4E-05	2E-04	2E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	1E-03	2E-04	NA	1E-03	NA	1E-03	NA	1E-03	NA	NA	NA
7440-47-3	Chromium	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	7E-05	NA	NA	7E-05	NA	NA	NA	NA	7E-05	NA	NA
7440-02-0	Nickel	23	2E-04	NA	1E-04	3E-04	NA	3E-04	NA	NA	NA	3E-04	NA
7782-49-2	Selenium	4	1E-04	NA	NA	1E-04	NA	NA	1E-04	NA	NA	NA	1E-04
7440-28-0	Thallium	2	6E-03	NA	NA	6E-03	NA	NA	6E-03	NA	NA	NA	6E-03
7440-61-1	Uranium	15	1E-02	NA	1E-04	1E-02	NA	NA	NA	1E-02	NA	NA	NA
7440-62-2	Vanadium	29	9E-04	NA	NA	9E-04	NA	9E-04	NA	NA	NA	NA	NA
		Total HIs:	2E-02	2E-04	3E-04	2E-02	8E-04	3E-03	6E-03	1E-02	7E-05	3E-04	6E-03
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	1	6E-04	NA	NA	6E-04	6E-04	6E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	2	6E-03	NA	NA	6E-03	NA	NA	6E-03	NA	NA	NA	6E-03
7440-61-1	Uranium	15	1E-02	NA	1E-04	1E-02	NA	NA	NA	1E-02	NA	NA	NA
		Total HIs:	2E-02	NA	1E-04	2E-02	6E-04	6E-04	6E-03	1E-02	NA	NA	6E-03
Road Worker (Surface Soil)													
7440-36-0	Antimony	1	5E-03	NA	NA	5E-03	5E-03	5E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	2E-03	NA	4E-04	2E-03	2E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	1E-02	2E-03	NA	1E-02	NA	1E-02	NA	1E-02	NA	NA	NA
7440-47-3	Chromium	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	6E-04	NA	NA	6E-04	NA	NA	NA	NA	6E-04	NA	NA
7440-02-0	Nickel	23	2E-03	NA	1E-03	3E-03	NA	3E-03	NA	NA	NA	3E-03	NA
7782-49-2	Selenium	4	1E-03	NA	NA	1E-03	NA	NA	1E-03	NA	NA	NA	1E-03
7440-28-0	Thallium	2	5E-02	NA	NA	5E-02	NA	NA	5E-02	NA	NA	NA	5E-02
7440-61-1	Uranium	15	1E-01	NA	1E-03	1E-01	NA	NA	NA	1E-01	NA	NA	NA
7440-62-2	Vanadium	29	8E-03	NA	NA	8E-03	NA	8E-03	NA	NA	NA	NA	NA
		Total HIs:	2E-01	2E-03	3E-03	2E-01	7E-03	3E-02	5E-02	1E-01	6E-04	3E-03	5E-02

Table F-6-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	1	5E-03	NA	NA	5E-03	5E-03	5E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	2	5E-02	NA	NA	5E-02	NA	NA	5E-02	NA	NA	NA	5E-02
7440-61-1	Uranium	15	1E-01	NA	1E-03	1E-01	NA	NA	NA	1E-01	NA	NA	NA
		Total HIs:	2E-01	NA	1E-03	2E-01	5E-03	5E-03	5E-02	1E-01	NA	NA	5E-02
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	1	1E-03	NA	NA	1E-03	1E-03	1E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	5E-04	NA	1E-04	6E-04	6E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	6E-03	3E-04	NA	6E-03	NA	6E-03	NA	6E-03	NA	NA	NA
7440-47-3	Chromium	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	2E-04	NA	NA	2E-04	NA	NA	NA	NA	2E-04	NA	NA
7440-02-0	Nickel	23	5E-04	NA	3E-04	8E-04	NA	8E-04	NA	NA	NA	8E-04	NA
7782-49-2	Selenium	4	3E-04	NA	NA	3E-04	NA	NA	3E-04	NA	NA	NA	3E-04
7440-28-0	Thallium	2	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	15	3E-02	NA	4E-04	3E-02	NA	NA	NA	3E-02	NA	NA	NA
7440-62-2	Vanadium	29	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	6E-02	3E-04	7E-04	6E-02	2E-03	1E-02	1E-02	4E-02	2E-04	8E-04	1E-02
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	1	2E-04	NA	NA	2E-04	2E-04	2E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	2	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	15	3E-03	NA	4E-04	4E-03	NA	NA	NA	4E-03	NA	NA	NA
		Total HIs:	5E-03	NA	4E-04	5E-03	2E-04	2E-04	2E-03	4E-03	NA	NA	2E-03

Table F-6-1. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	1	3E-04	NA	NA	3E-04	3E-04	3E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	9E-05	NA	2E-06	9E-05	9E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	6E-04	4E-04	3E-06	9E-04	NA	9E-04	NA	9E-04	NA	NA	NA
7440-47-3	Chromium	19	5E-04	NA	8E-07	5E-04	NA	5E-04	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	3E-05	NA	NA	3E-05	NA	NA	NA	NA	3E-05	NA	NA
7440-02-0	Nickel	23	9E-05	NA	1E-06	9E-05	NA	9E-05	NA	NA	NA	9E-05	NA
7782-49-2	Selenium	4	6E-05	NA	9E-10	6E-05	NA	NA	6E-05	NA	NA	NA	6E-05
7440-28-0	Thallium	2	7E-03	NA	NA	7E-03	NA	NA	7E-03	NA	NA	NA	7E-03
7440-61-1	Uranium	15	4E-04	NA	2E-06	4E-04	NA	NA	NA	4E-04	NA	NA	NA
7440-62-2	Vanadium	29	5E-04	NA	NA	5E-04	NA	5E-04	NA	NA	NA	NA	NA
		Total HIs:	9E-03	4E-04	9E-06	1E-02	4E-04	2E-03	7E-03	1E-03	3E-05	9E-05	7E-03
Resident (Surface Soil)													
7440-36-0	Antimony	1	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	226	4E-03	NA	6E-08	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	7	3E-02	3E-03	4E-11	3E-02	NA	3E-02	NA	3E-02	NA	NA	NA
7440-47-3	Chromium	19	2E-02	NA	1E-09	2E-02	NA	2E-02	NA	NA	NA	NA	NA
7439-98-7	Molydenum	2	2E-03	NA	NA	2E-03	NA	NA	NA	NA	2E-03	NA	NA
7440-02-0	Nickel	23	4E-03	NA	1E-09	4E-03	NA	4E-03	NA	NA	NA	4E-03	NA
7782-49-2	Selenium	4	3E-03	NA	4E-08	3E-03	NA	NA	3E-03	NA	NA	NA	3E-03
7440-28-0	Thallium	2	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	15	2E-02	NA	3E-10	2E-02	NA	NA	NA	2E-02	NA	NA	NA
7440-62-2	Vanadium	29	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	5E-01	3E-03	1E-07	5E-01	2E-02	9E-02	3E-01	5E-02	2E-03	4E-03	3E-01
Resident (Subsurface Soil)													
7440-36-0	Antimony	1	1E-02	NA	NA	1E-02	1E-02	1E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	2	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	15	2E-02	NA	3E-10	2E-02	NA	NA	NA	2E-02	NA	NA	NA
		Total HIs:	4E-01	NA	3E-10	4E-01	1E-02	1E-02	3E-01	2E-02	NA	NA	3E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	1E-07	1E-07
7440-47-3	Chromium	19	1E-06	NA	2E-06	3E-06
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	5E-08	5E-08
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	1E-06	NA	2E-06	3E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	4E-09	4E-09
7440-47-3	Chromium	19	6E-07	NA	7E-08	6E-07
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	2E-09	2E-09
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	6E-07	NA	8E-08	6E-07
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-6-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	2E-10	2E-10
7440-47-3	Chromium	19	2E-08	NA	3E-09	3E-08
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	8E-11	8E-11
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	2E-08	NA	3E-09	3E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Road Worker (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	1E-09	1E-09
7440-47-3	Chromium	19	2E-07	NA	3E-08	2E-07
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	7E-10	7E-10
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	2E-07	NA	3E-08	2E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-6-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	3E-09	3E-09
7440-47-3	Chromium	19	4E-07	NA	5E-08	4E-07
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	1E-09	1E-09
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	4E-07	NA	5E-08	4E-07
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	7E-12	7E-12
7440-47-3	Chromium	19	1E-07	NA	1E-10	1E-07
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	3E-12	3E-12
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	1E-07	NA	1E-10	1E-07

Table F-6-2. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at the SLAPS

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	226	NA	NA	NA	NA
7440-43-9	Cadmium	7	NA	NA	3E-09	3E-09
7440-47-3	Chromium	19	6E-05	NA	1E-07	6E-05
7439-98-7	Molydenum	2	NA	NA	NA	NA
7440-02-0	Nickel	23	NA	NA	1E-09	1E-09
7782-49-2	Selenium	4	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
7440-62-2	Vanadium	29	NA	NA	NA	NA
		Total CRs:	6E-05	NA	1E-07	6E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	1	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	2	NA	NA	NA	NA
7440-61-1	Uranium	15	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	1E-03
7440-38-2	Arsenic	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	2.26E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	5E-04
7440-43-9	Cadmium	6.95E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	3E-03
7440-47-3	Chromium	1.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	3E-03
7439-98-7	Molydenum	2.07E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-04
7440-02-0	Nickel	2.32E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	5E-04
7782-49-2	Selenium	4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-28-0	Thallium	1.71E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	4E-02
7440-61-1	Uranium	1.52E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7440-62-2	Vanadium	2.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
																			Total HI_{ing} =	5E-02
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-43-9	Cadmium	6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-02
7440-47-3	Chromium	1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-02-0	Nickel	2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7782-49-2	Selenium	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-01
7440-62-2	Vanadium	2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
																			Total HI_{ing} =	5E-01
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-01
																			Total HI_{ing} =	5E-01

Table F-6-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-43-9	Cadmium	6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-47-3	Chromium	1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	7E-05
7440-02-0	Nickel	2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7782-49-2	Selenium	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-62-2	Vanadium	2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	9E-04
																		Total HI_{ing} =		2E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
																		Total HI_{ing} =		2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-43-9	Cadmium	6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-47-3	Chromium	1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	6E-04
7440-02-0	Nickel	2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7782-49-2	Selenium	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-62-2	Vanadium	2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
																		Total HI_{ing} =		2E-01

Table F-6-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC x IR_s x FI x CF x EF x ED x (1 / RfD_o)) / (BW x AT_{nc}) = HQ_{ing}
	Units:	mg/kg mg/day unitless mg/kg days/yr yr mg/kg-day kg days unitless
CAS No.	**COC**	
Road Worker (Subsurface Soil) - Subchronic Exposures		
7440-36-0	Antimony	(1.36E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 9.00E+01 x 1.00E+00 x (1 / 4.00E-04)) / (8.00E+01 x 3.65E+02) = 5E-03
7440-38-2	Arsenic	(Not a COC x 4.80E+02 x 1.00E+00 x 1.00E-06 x 9.00E+01 x 1.00E+00 x (1 / 3.00E-04)) / (8.00E+01 x 3.65E+02) = NA
7440-28-0	Thallium	(1.71E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 9.00E+01 x 1.00E+00 x (1 / 5.00E-05)) / (8.00E+01 x 3.65E+02) = 5E-02
7440-61-1	Uranium	(1.52E+01 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 9.00E+01 x 1.00E+00 x (1 / 2.00E-04)) / (8.00E+01 x 3.65E+02) = 1E-01
		Total HI_{ing} = 2E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures		
7440-36-0	Antimony	(1.36E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 4.00E-04)) / (8.00E+01 x 2.41E+03) = 1E-03
7440-38-2	Arsenic	(Not a COC x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 3.00E-04)) / (8.00E+01 x 2.41E+03) = NA
7440-39-3	Barium	(2.26E+02 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 2.00E-01)) / (8.00E+01 x 2.41E+03) = 5E-04
7440-43-9	Cadmium	(6.95E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.00E-04)) / (8.00E+01 x 2.41E+03) = 6E-03
7440-47-3	Chromium	(1.88E+01 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / ---)) / (8.00E+01 x 2.41E+03) = NA
7439-98-7	Molydenum	(2.07E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.00E-03)) / (8.00E+01 x 2.41E+03) = 2E-04
7440-02-0	Nickel	(2.32E+01 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 2.00E-02)) / (8.00E+01 x 2.41E+03) = 5E-04
7782-49-2	Selenium	(4.00E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.00E-03)) / (8.00E+01 x 2.41E+03) = 3E-04
7440-28-0	Thallium	(1.71E+00 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.00E-05)) / (8.00E+01 x 2.41E+03) = 1E-02
7440-61-1	Uranium	(1.52E+01 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 2.00E-04)) / (8.00E+01 x 2.41E+03) = 3E-02
7440-62-2	Vanadium	(2.88E+01 x 4.80E+02 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.04E-03)) / (8.00E+01 x 2.41E+03) = 2E-03
		Total HI_{ing} = 6E-02
Maintenance Worker (Subsurface Soil) - Subchronic Exposures		
7440-36-0	Antimony	(1.36E+00 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 4.00E-04)) / (8.00E+01 x 2.41E+03) = 2E-04
7440-38-2	Arsenic	(Not a COC x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 3.00E-04)) / (8.00E+01 x 2.41E+03) = NA
7440-28-0	Thallium	(1.71E+00 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 5.00E-05)) / (8.00E+01 x 2.41E+03) = 2E-03
7440-61-1	Uranium	(1.52E+01 x 5.00E+01 x 1.00E+00 x 1.00E-06 x 2.60E+01 x 6.60E+00 x (1 / 2.00E-04)) / (8.00E+01 x 2.41E+03) = 3E-03
		Total HI_{ing} = 5E-03

Table F-6-3. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	1.36E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	3E-04
7440-38-2	Arsenic	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	2.26E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	) =	9E-05
7440-43-9	Cadmium	6.95E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	6E-04
7440-47-3	Chromium	1.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	5E-04
7439-98-7	Molydenum	2.07E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	3E-05
7440-02-0	Nickel	2.32E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	) =	9E-05
7782-49-2	Selenium	4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7440-28-0	Thallium	1.71E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	7E-03
7440-61-1	Uranium	1.52E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	4E-04
7440-62-2	Vanadium	2.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	) =	5E-04
																			Total HI_{ing} =	9E-03

"---" - Value not available

IR_s - Soil ingestion rate

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

BW - Body weight

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7439-98-7	Molydenum	(2.07E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	1E-06
Construction Worker (Surface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7439-98-7	Molydenum	(2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-07
Construction Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00

Table F-6-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Utility Worker (Surface Soil)																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7439-98-7	Molydenum	2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	2E-08
Utility Worker (Subsurface Soil)																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Road Worker (Surface Soil)																				
7440-36-0	Antimony	1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	2E-07
7439-98-7	Molydenum	2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	2E-07

Table F-6-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Road Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7439-98-7	Molydenum	(2.07E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	4E-07
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00

Table F-6-4. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Recreational User/Trespasser (Surface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	1E-07
7439-98-7	Molydenum	(2.07E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	1E-07

"---" - Value not available

IR_s - Soil ingestion rate

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

BW - Body weight

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-5. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	(1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr			mg/kg-day		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(1.36E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	1E-02
7440-38-2	Arsenic	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	NA
7440-39-3	Barium	(2.26E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-01	)) /	9.49E+03	=	4E-03
7440-43-9	Cadmium	(6.95E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	1.00E-03	)) /	9.49E+03	=	3E-02
7440-47-3	Chromium	(1.88E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	2E-02
7439-98-7	Molydenum	(2.07E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	2E-03
7440-02-0	Nickel	(2.32E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-02	)) /	9.49E+03	=	4E-03
7782-49-2	Selenium	(4.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.00E-03	)) /	9.49E+03	=	3E-03
7440-28-0	Thallium	(1.71E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	3E-01
7440-61-1	Uranium	(1.52E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	2E-02
7440-62-2	Vanadium	(2.88E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	5.04E-03	)) /	9.49E+03	=	2E-02
																Total HI_{ing} =	5E-01
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(1.36E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	4.00E-04	)) /	9.49E+03	=	1E-02
7440-38-2	Arsenic	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-04	)) /	9.49E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	2.00E-05	)) /	9.49E+03	=	3E-01
7440-61-1	Uranium	(1.52E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	(1 /	3.00E-03	)) /	9.49E+03	=	2E-02
																Total HI_{ing} =	4E-01

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-6. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	1.36E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	(	2.26E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	6.95E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	MOA	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	2.07E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	2.32E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	4.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	1.71E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	1.52E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	2.88E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	1.36E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	1.71E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	1.52E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-7. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			mg/day		years		kg		mg/day		years		kg	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-8. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at the SLAPS

		Equation:	(EPC	x	$IFSM_{adj}$	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	MR_{ing}
		Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**	**Is COC Mutagenic? (Yes/No)**															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(1.36E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(Not a COC	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	No	(2.26E+02	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	No	(6.95E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	**Yes**	(1.88E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	6.1E-05
7439-98-7	Molydenum	No	(2.07E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	No	(2.32E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	No	(4.00E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(1.71E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(1.52E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	No	(2.88E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	6.1E-05
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(1.36E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(Not a COC	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(1.71E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(1.52E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	NA

"---" - Value not available

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

MR_{ing} - Mutagenic cancer risk from ingestion

NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-9. Calculation of Age Adjusted Soil Ingestion Factor for Mutigenic Mode of Action - Resident

$IFSM_{adj}$	=	((	IR_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$	) /	BW_{0-2}	) + ((	IR_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$	) /	BW_{2-6}	) + ((	IR_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$	) /	BW_{6-16}	) + ((	IR_{16-26}	x	ED_{16-26}	x	$ADAF_{16-26}$	) /	BW_{16-26}	)
mg-year/kg-day			mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg	
4.77E+02	=	((	2.00E+02	x	2.00E+00	x	1.00E+01	) /	1.50E+01	) + ((	2.00E+02	x	4.00E+00	x	3.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	1.00E+01	x	3.00E+00	) /	8.00E+01	) + ((	1.00E+02	x	1.00E+01	x	1.00E+00	) /	8.00E+01	)

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity
IR_{s-cr} - Soil ingestion rate for child resident
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-10. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	2.26E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	6.95E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-03
7440-47-3	Chromium	1.88E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	2.07E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	2.32E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	4.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	2.88E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																				Total HI_{derm} =		1E-03
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-47-3	Chromium	1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{derm} =		5E-03
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																				Total HI_{derm} =		0E+00

Table F-6-10. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-47-3	Chromium	1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-47-3	Chromium	1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-03

Table F-6-10. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	2.26E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	6.95E+00	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-47-3	Chromium	1.88E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	2.07E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	2.32E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	4.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	2.88E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	3E-04
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	1.36E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	1.71E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	1.52E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	0E+00

Table F-6-10. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(1.36E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	(2.26E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	4E-04
7440-47-3	Chromium	(1.88E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(2.32E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(4.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(1.71E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(1.52E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	4E-04

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-11. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Construction Worker (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Construction Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

Table F-6-11. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Utility Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Road Worker (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

Table F-6-11. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		0E+00
Maintenance Worker (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		0E+00
Maintenance Worker (Subsurface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{derm} =		0E+00

Table F-6-11. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil)																						
7440-36-0	Antimony	(1.36E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(2.26E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.88E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(2.32E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(4.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.71E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.52E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-12. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x (1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
Units:		mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(1.36E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	NA
7440-39-3	Barium	(2.26E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(6.95E+00	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x (1 /	2.50E-05	)) /	9.49E+03	) =	3E-03
7440-47-3	Chromium	(1.88E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(2.07E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(2.32E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(4.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(2.88E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.31E-04	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	3E-03
Resident (Subsurface Soil)																
7440-36-0	Antimony	(1.36E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(1.71E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(1.52E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	0E+00

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-13. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

Equation:		(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
Units:			mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	1.36E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	(	2.26E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	6.95E+00	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	MOA	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	2.07E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	2.32E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	4.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.71E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.52E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.88E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	1.36E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.71E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.52E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00

"---" - Value not available
DSF_{adj} - Age-adjusted dermal factor
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-14. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	=	(	(	**$SA_{s\text{-}cr}$**	x	**$AF_{s\text{-}cr}$**	x	**ED_{cr}**	)	/	**BW_c**	)	+	(	(	**$SA_{s\text{-}ar}$**	x	**$AF_{s\text{-}ar}$**	x	**ED_{ar}**	)	/	**BW_a**	)
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
$SA_{s\text{-}cr}$ - Skin surface area for child resident
$AF_{s\text{-}cr}$ - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
$SA_{s\text{-}ar}$ - Skin surface area for adult resident
$AF_{s\text{-}ar}$ - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-15. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at the SLAPS

		Equation:	(EPC	x	$DFSM_{adj}$	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	MR_{derm}
		Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	**COC**	**Is COC Mutagenic? (Yes/No)**															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(1.36E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(Not a COC	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	No	(2.26E+02	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	No	(6.95E+00	x	1.36E+03	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	**Yes**	(1.88E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	No	(2.07E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	No	(2.32E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	No	(4.00E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(1.71E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(1.52E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	No	(2.88E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(1.36E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(Not a COC	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(1.71E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(1.52E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA

"---" - Value not available

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity

CF - Conversion factor

EF - Exposure frequency

SF_d - Dermal cancer slope factor

AT_c - Carcinogenic averaging time

MR_{derm} - Mutagenic cancer risk from dermal contact

NA - CR not calculated because COC is not mutagenic, there is not available dermal absorption fraction and/or there is no available toxicity criterion.

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-16. Calculation of Age Adjusted Soil Dermal Contact Factor for Mutagenic Mode of Action: Resident

$DFSM_{adj}$	=	((	SA_{0-2}	x	AF_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$	) /	BW_{0-2}	) + ((	SA_{2-6}	x	AF_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$	) /	BW_{2-6}	) + ((	SA_{6-16}	x	AF_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$	) /	BW_{6-16}	) + ((	SA_{16-30}	x	AF_{16-30}	x	ED_{16-26}	x	$ADAF_{16-30}$	) /	BW_{16-30}	)
mg-year/kg-day			cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg	
1.36E+03	=	((	2.69E+03	x	2.00E-01	x	2.00E+00	x	1.00E+01	) /	1.50E+01	) + ((	2.69E+03	x	2.00E-01	x	4.00E+00	x	3.00E+00	) /	1.50E+01	) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	3.00E+00	) /	8.00E+01	) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	1.00E+00	) /	8.00E+01	)

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity
SA_{0-2} - Skin surface area available for exposure for child resident, ages 0 to 2 Years
SA_{2-6} - Skin surface area available for exposure for child resident, ages 2 to 6 Years
SA_{6-16} - Skin surface area available for exposure for child resident, ages 6 to 16 Years
SA_{16-26} - Skin surface area available for exposure for adult resident, ages 16 to 26 Years
AF_{0-2} - Soil-to-skin adherence factor for child resident, ages 0 to 2 Years
AF_{2-6} - Soil-to-skin adherence factor for child resident, ages 2 to 6 Years
AF_{6-16} - Soil-to-skin adherence factor for child resident, ages 6 to 16 Years
AF_{16-26} - Soil-to-skin adherence factor for adult resident, ages 16 to 26 Years
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-17. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	) /	2.19E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.50E-05	) /	2.19E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	5.00E-04	) /	2.19E+05	=	1E-02
7440-43-9	Cadmium	(6.95E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.00E-05	) /	2.19E+05	=	2E-02
7440-47-3	Chromium	(1.88E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.00E-04	) /	2.19E+05	=	4E-03
7439-98-7	Molydenum	(2.07E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	) /	2.19E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	9.00E-05	) /	2.19E+05	=	6E-03
7782-49-2	Selenium	(4.00E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.00E-02	) /	2.19E+05	=	5E-06
7440-28-0	Thallium	(1.71E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	) /	2.19E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.00E-05	) /	2.19E+05	=	9E-03
7440-62-2	Vanadium	(2.88E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	) /	2.19E+05	=	NA
														Total HI_{inh} =		5E-02
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.50E-05	) /	8.76E+03	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	5.00E-03	) /	8.76E+03	=	1E-03
7440-43-9	Cadmium	(6.95E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7440-47-3	Chromium	(1.88E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7439-98-7	Molydenum	(2.07E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.00E-04	) /	8.76E+03	=	3E-03
7782-49-2	Selenium	(4.00E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.00E-04	) /	8.76E+03	=	3E-03
7440-62-2	Vanadium	(2.88E+01	x	1.00E+07	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	) /	8.76E+03	=	NA
														Total HI_{inh} =		7E-03

Table F-6-17. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}												
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07 |) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.50E-05 |)) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 / 1.00E-04 |)) /	8.76E+03	=	3E-03
														Total HI_{inh} =		3E-03
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.50E-05 |)) /	8.76E+03	=	NA
7440-39-3	Barium	(2.26E+02	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 5.00E-03 |)) /	8.76E+03	=	4E-05
7440-43-9	Cadmium	(6.95E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-47-3	Chromium	(1.88E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(2.07E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-02-0	Nickel	(2.32E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 2.00E-04 |)) /	8.76E+03	=	1E-04
7782-49-2	Selenium	(4.00E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.00E-04 |)) /	8.76E+03	=	1E-04
7440-62-2	Vanadium	(2.88E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
														Total HI_{inh} =		3E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.50E-05 |)) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / --- |)) /	8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07 |) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	(1 / 1.00E-04 |)) /	8.76E+03	=	1E-04
														Total HI_{inh} =		1E-04

Table F-6-17. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	NA
7440-39-3	Barium	(2.26E+02	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 5.00E-03)) /		8.76E+03	=	4E-04
7440-43-9	Cadmium	(6.95E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-47-3	Chromium	(1.88E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7439-98-7	Molydenum	(2.07E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-02-0	Nickel	(2.32E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 2.00E-04)) /		8.76E+03	=	1E-03
7782-49-2	Selenium	(4.00E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	1E-03
7440-62-2	Vanadium	(2.88E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
														Total HI_{inh} =		3E-03
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	1E-03
														Total HI_{inh} =		1E-03

Table F-6-17. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Maintenance Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 1.50E-05)) /		5.78E+04	=	NA
7440-39-3	Barium	(2.26E+02	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 5.00E-03)) /		5.78E+04	=	1E-04
7440-43-9	Cadmium	(6.95E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-47-3	Chromium	(1.88E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7439-98-7	Molydenum	(2.07E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-02-0	Nickel	(2.32E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 2.00E-04)) /		5.78E+04	=	3E-04
7782-49-2	Selenium	(4.00E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 1.00E-04)) /		5.78E+04	=	4E-04
7440-62-2	Vanadium	(2.88E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
														Total HI_{inh} =		7E-04
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 1.50E-05)) /		5.78E+04	=	NA
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / ---)) /		5.78E+04	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	2.60E+01	x	6.60E+00	x	(1 / 1.00E-04)) /		5.78E+04	=	4E-04
														Total HI_{inh} =		4E-04

Table F-6-17. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(1.36E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.50E-05)) /		7.88E+04	=	NA
7440-39-3	Barium	(2.26E+02	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 5.00E-04)) /		7.88E+04	=	2E-06
7440-43-9	Cadmium	(6.95E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.00E-05)) /		7.88E+04	=	3E-06
7440-47-3	Chromium	(1.88E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.00E-04)) /		7.88E+04	=	8E-07
7439-98-7	Molydenum	(2.07E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA
7440-02-0	Nickel	(2.32E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 9.00E-05)) /		7.88E+04	=	1E-06
7782-49-2	Selenium	(4.00E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 2.00E-02)) /		7.88E+04	=	9E-10
7440-28-0	Thallium	(1.71E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA
7440-61-1	Uranium	(1.52E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 4.00E-05)) /		7.88E+04	=	2E-06
7440-62-2	Vanadium	(2.88E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA
														Total HI_{inh} =		9E-06

"---" - Value not available

ET - Exposure time

EF - Exposure frequency

AT_{nc} - Noncarcinogenic averaging time

HQ_{inh} - Hazard quotient for individual COC from inhalation

HI_{inh} - Hazard index summed over individual HQs from inhalation

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-18. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Industrial Worker (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)) /	6.13E+05	=	1E-07
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)) /	6.13E+05	=	2E-06
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)) /	6.13E+05	=	5E-08
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	2E-06
Construction Worker (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	4E-09
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	7E-08
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	2E-09
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	8E-08

Table F-6-18. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Construction Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00
Utility Worker (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-10
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	3E-09
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	8E-11
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	3E-09
Utility Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-18. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	1E-09
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	3E-08
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	7E-10
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	3E-08
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-18. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	3E-09
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	5E-08
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	5E-08
Maintenance Worker (Subsurface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-18. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	7E-12
7440-47-3	Chromium	(1.88E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)) /	6.13E+05	=	1E-10
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	3E-12
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-10

"---" - Value not available

CF - Conversion factor

ET - Exposure time

EF - Exposure frequency

AT_c - Carcinogenic averaging time

CR_{inh} - Cancer risk from inhalation

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-19. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

	Equation:	**(**	**EPC**	**x**	**CF**	**(1 /**	**PEF**	**) x**	**ET**	**x**	**EF**	**) x (**	**ED_{cr}**	**+**	**ED_{ar}**	**) x**	**RfC**	**)) /**	**AT_c**	**=**	**CR_{inh}**
	Units:		**mg/kg**		**µg/mg**		**m^3/kg**		**hours/day**		**days/year**		**years**		**years**		**mg/m^3**		**hours**		**unitless**
CAS No.	**COC**																				
Resident (Surface Soil)																					
7440-36-0	Antimony	(	1.36E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	NA
7440-39-3	Barium	(	2.26E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	5.00E-04	)) /	2.28E+05	=	6E-08
7440-43-9	Cadmium	(	6.95E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-05	)) /	2.28E+05	=	4E-11
7440-47-3	Chromium	(	1.88E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-04	)) /	2.28E+05	=	1E-09
7439-98-7	Molydenum	(	2.07E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(	2.32E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	9.00E-05	)) /	2.28E+05	=	1E-09
7782-49-2	Selenium	(	4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.00E-02	)) /	2.28E+05	=	4E-08
7440-28-0	Thallium	(	1.71E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	1.52E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	3E-10
7440-62-2	Vanadium	(	2.88E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																				Total HI_{inh} =	1E-07
Resident (Subsurface Soil)																					
7440-36-0	Antimony	(	1.36E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	NA
7440-28-0	Thallium	(	1.71E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	1.52E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	3E-10
																				Total HI_{inh} =	3E-10

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-20. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

Equation:		(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	IUR	)) /	AT_c	=	CR_{inh}
Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																			
Resident (Surface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(2.26E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(6.95E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	3E-09
7440-47-3	Chromium	(MOA	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(2.07E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(2.32E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(4.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.88E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	4E-09
Resident (Subsurface Soil)																				
7440-36-0	Antimony	(1.36E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.71E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.52E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	0E+00

"---" - Value not available

CF - Conversion factor

ET - Exposure time

EF - Exposure frequency

ED_{cr} - Exposure duration for child

ED_{ar} - Exposure duration for adult

AT_c - Carcinogenic averaging time

CR_{inh} - Cancer risk from inhalation

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-21. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at the SLAPS

		Equation:	(EPC	x	CF	x	(1 / PEF	)	x	ET	x	EF	x	((ED_{0-2}	x	$ADAF_{0-2}$	) + (ED_{2-6}	x	$ADAF_{2-6}$	) + (ED_{6-16}	x	$ADAF_{6-16}$	) + (ED_{16-26}	x	$ADAF_{16-26}$	))	x	IUR	) /	AT_{c-inh}	=	MR_{inh}
		Units:	mg/kg		µg/mg		m^3/kg			hours/day		days/year		years		unitless	years		unitless	years		unitless	years		unitless			$(µg/m^3)^{-1}$		hours		unitless
CAS No.	**COC**	**Is COC Mutagenic? (Yes/No)**																													
Resident (Surface Soil)																															
7440-36-0	Antimony	No	1.36E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-38-2	Arsenic	No	Not a COC	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	4.30E-03	) /	6.13E+05	=	NA
7440-39-3	Barium	No	2.26E+02	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-43-9	Cadmium	No	6.95E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	1.80E-03	) /	6.13E+05	=	NA
7440-47-3	Chromium	**Yes**	1.88E+01	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	1.20E-02	) /	6.13E+05	=	1.3E-07
7439-98-7	Molydenum	No	2.07E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-02-0	Nickel	No	2.32E+01	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	2.60E-04	) /	6.13E+05	=	NA
7782-49-2	Selenium	No	4.00E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-28-0	Thallium	No	1.71E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-61-1	Uranium	No	1.52E+01	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-62-2	Vanadium	No	2.88E+01	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
																														Total MR_{inh} =		1.3E-07
Resident (Subsurface Soil)																															
7440-36-0	Antimony	No	1.36E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-38-2	Arsenic	No	Not a COC	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	4.30E-03	) /	6.13E+05	=	NA
7440-28-0	Thallium	No	1.71E+00	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
7440-61-1	Uranium	No	1.52E+01	x	1.00E+03	x	1.36E+09	)	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	4.00E+00	x	3.00E+00	1.00E+01	x	3.00E+00	1.00E+01	x	1.00E+00	))	x	---	) /	6.13E+05	=	NA
																														Total MR_{inh} =		NA

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
AT_c - Carcinogenic averaging time
MR_{inh} - Mutagenic cancer risk from inhalation
NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion
Not a COC - Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

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Table F-6-22. Surface Soil EPCs for Metal COCs at the SLAPS

CAS No.	COC	Surface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	1.4
7440-38-2	Arsenic	Not a COC
7440-39-3	Barium	226
7440-43-9	Cadmium	6.9
7440-47-3	Chromium	19
7439-98-7	Molydenum	2.1
7440-02-0	Nickel	23.2
7782-49-2	Selenium	4.0
7440-28-0	Thallium	1.7
7440-61-1	Uranium	15
7440-62-2	Vanadium	29

[a] EPCs obtained from the SLAPS PRAR-FSSE (USACE 2009c).

[b] Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-23. Subsurface Soil EPCs for Metal COCs at the SLAPS

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	1.4
7440-38-2	Arsenic	Not a COC
7440-28-0	Thallium	1.7
7440-61-1	Uranium	15

[a] EPCs obtained from the SLAPS PRAR-FSSE (USACE 2009c).

[b] Although arsenic was sampled at the SLAPS during post-remediation verification, arsenic concentrations detected at the SLAPS is not co-located with MED/AEC-related radiological contamination; therefore, the detected arsenic was determined to be unrelated to past MED/AEC activities and was removed as a COC for this evaluation. The USACE is currently preparing a position paper that addresses the removal of arsenic as a SLAPS COC for the third five-year review risk evaluations.

Table F-6-24. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the Inhalation UR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-6-25. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	0.42	4E-04	NA	NA	4E-04	4E-04	4E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	3E-04	NA	7E-03	7E-03	7E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	3E-05	1E-05	2E-04	2E-04	NA	2E-04	NA	2E-04	NA	NA	NA
7440-47-3	Chromium	14	2E-03	NA	3E-03	5E-03	NA	5E-03	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-04	NA	NA	1E-04	NA	NA	NA	NA	1E-04	NA	NA
7440-02-0	Nickel	19	4E-04	NA	5E-03	5E-03	NA	5E-03	NA	NA	NA	5E-03	NA
7782-49-2	Selenium	1.0	8E-05	NA	1E-06	9E-05	NA	NA	9E-05	NA	NA	NA	9E-05
7440-28-0	Thallium	0.50	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	11	2E-03	NA	6E-03	8E-03	NA	NA	NA	8E-03	NA	NA	NA
7440-62-2	Vanadium	26	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	2E-02	1E-05	2E-02	4E-02	8E-03	1E-02	1E-02	8E-03	1E-04	5E-03	1E-02
Construction Worker (Surface Soil)													
7440-36-0	Antimony	0.42	4E-03	NA	NA	4E-03	4E-03	4E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	3E-03	NA	7E-04	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	3E-04	5E-05	NA	4E-04	NA	4E-04	NA	4E-04	NA	NA	NA
7440-47-3	Chromium	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-03	NA	NA	1E-03	NA	NA	NA	NA	1E-03	NA	NA
7440-02-0	Nickel	19	4E-03	NA	2E-03	6E-03	NA	6E-03	NA	NA	NA	6E-03	NA
7782-49-2	Selenium	1.0	8E-04	NA	NA	8E-04	NA	NA	8E-04	NA	NA	NA	8E-04
7440-28-0	Thallium	0.50	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	11	2E-01	NA	3E-03	2E-01	NA	NA	NA	2E-01	NA	NA	NA
7440-62-2	Vanadium	26	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	3E-01	5E-05	5E-03	3E-01	8E-03	3E-02	4E-02	2E-01	1E-03	6E-03	4E-02
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	4.5	5E-02	NA	NA	5E-02	5E-02	5E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	1.4	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	12	2E-01	NA	3E-03	2E-01	NA	NA	NA	2E-01	NA	NA	NA
		Total HIs:	4E-01	NA	3E-03	4E-01	5E-02	5E-02	1E-01	2E-01	NA	NA	1E-01

Table F-6-25. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	0.42	2E-04	NA	NA	2E-04	2E-04	2E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	1E-04	NA	3E-05	2E-04	2E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	1E-05	2E-06	NA	1E-05	NA	1E-05	NA	1E-05	NA	NA	NA
7440-47-3	Chromium	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	5E-05	NA	NA	5E-05	NA	NA	NA	NA	5E-05	NA	NA
7440-02-0	Nickel	19	2E-04	NA	9E-05	2E-04	NA	2E-04	NA	NA	NA	2E-04	NA
7782-49-2	Selenium	1.0	3E-05	NA	NA	3E-05	NA	NA	3E-05	NA	NA	NA	3E-05
7440-28-0	Thallium	0.50	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	11	9E-03	NA	1E-04	9E-03	NA	NA	NA	9E-03	NA	NA	NA
7440-62-2	Vanadium	26	8E-04	NA	NA	8E-04	NA	8E-04	NA	NA	NA	NA	NA
		Total HIs:	1E-02	2E-06	2E-04	1E-02	3E-04	1E-03	2E-03	9E-03	5E-05	2E-04	2E-03
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	4.5	2E-03	NA	NA	2E-03	2E-03	2E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	1.4	5E-03	NA	NA	5E-03	NA	NA	5E-03	NA	NA	NA	5E-03
7440-61-1	Uranium	12	1E-02	NA	1E-04	1E-02	NA	NA	NA	1E-02	NA	NA	NA
		Total HIs:	2E-02	NA	1E-04	2E-02	2E-03	2E-03	5E-03	1E-02	NA	NA	5E-03
Road Worker (Surface Soil)													
7440-36-0	Antimony	0.42	2E-03	NA	NA	2E-03	2E-03	2E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	1E-03	NA	3E-04	1E-03	1E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	1E-04	2E-05	NA	1E-04	NA	1E-04	NA	1E-04	NA	NA	NA
7440-47-3	Chromium	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	4E-04	NA	NA	4E-04	NA	NA	NA	NA	4E-04	NA	NA
7440-02-0	Nickel	19	1E-03	NA	8E-04	2E-03	NA	2E-03	NA	NA	NA	2E-03	NA
7782-49-2	Selenium	1.0	3E-04	NA	NA	3E-04	NA	NA	3E-04	NA	NA	NA	3E-04
7440-28-0	Thallium	0.50	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	11	8E-02	NA	9E-04	8E-02	NA	NA	NA	8E-02	NA	NA	NA
7440-62-2	Vanadium	26	8E-03	NA	NA	8E-03	NA	8E-03	NA	NA	NA	NA	NA
		Total HIs:	1E-01	2E-05	2E-03	1E-01	3E-03	1E-02	2E-02	8E-02	4E-04	2E-03	2E-02

Table F-6-25. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	4.5	2E-02	NA	NA	2E-02	2E-02	2E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	1.4	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	12	9E-02	NA	1E-03	9E-02	NA	NA	NA	9E-02	NA	NA	NA
		Total HIs:	1E-01	NA	1E-03	1E-01	2E-02	2E-02	4E-02	9E-02	NA	NA	4E-02
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	0.42	4E-04	NA	NA	4E-04	4E-04	4E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	3E-04	NA	7E-05	4E-04	4E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	6E-05	3E-06	NA	7E-05	NA	7E-05	NA	7E-05	NA	NA	NA
7440-47-3	Chromium	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-04	NA	NA	1E-04	NA	NA	NA	NA	1E-04	NA	NA
7440-02-0	Nickel	19	4E-04	NA	2E-04	6E-04	NA	6E-04	NA	NA	NA	6E-04	NA
7782-49-2	Selenium	1.0	8E-05	NA	NA	8E-05	NA	NA	8E-05	NA	NA	NA	8E-05
7440-28-0	Thallium	0.50	4E-03	NA	NA	4E-03	NA	NA	4E-03	NA	NA	NA	4E-03
7440-61-1	Uranium	11	2E-02	NA	3E-04	2E-02	NA	NA	NA	2E-02	NA	NA	NA
7440-62-2	Vanadium	26	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	3E-02	3E-06	6E-04	3E-02	8E-04	3E-03	4E-03	2E-02	1E-04	6E-04	4E-03
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	4.5	5E-04	NA	NA	5E-04	5E-04	5E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	1.4	1E-03	NA	NA	1E-03	NA	NA	1E-03	NA	NA	NA	1E-03
7440-61-1	Uranium	12	3E-03	NA	3E-04	3E-03	NA	NA	NA	3E-03	NA	NA	NA
		Total HIs:	4E-03	NA	3E-04	5E-03	5E-04	5E-04	1E-03	3E-03	NA	NA	1E-03

Table F-6-25. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	0.42	8E-05	NA	NA	8E-05	8E-05	8E-05	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	6E-05	NA	1E-06	6E-05	6E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	6E-06	4E-06	3E-08	1E-05	NA	1E-05	NA	1E-05	NA	NA	NA
7440-47-3	Chromium	14	4E-04	NA	6E-07	4E-04	NA	4E-04	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	2E-05	NA	NA	2E-05	NA	NA	NA	NA	2E-05	NA	NA
7440-02-0	Nickel	19	8E-05	NA	9E-07	8E-05	NA	8E-05	NA	NA	NA	8E-05	NA
7782-49-2	Selenium	1.0	2E-05	NA	2E-10	2E-05	NA	NA	2E-05	NA	NA	NA	2E-05
7440-28-0	Thallium	0.50	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	11	3E-04	NA	1E-06	3E-04	NA	NA	NA	3E-04	NA	NA	NA
7440-62-2	Vanadium	26	4E-04	NA	NA	4E-04	NA	4E-04	NA	NA	NA	NA	NA
		Total HIs:	3E-03	4E-06	4E-06	3E-03	1E-04	1E-03	2E-03	3E-04	2E-05	8E-05	2E-03
Resident (Surface Soil)													
7440-36-0	Antimony	0.42	4E-03	NA	NA	4E-03	4E-03	4E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-39-3	Barium	153	3E-03	NA	4E-08	3E-03	3E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	3E-04	4E-05	4E-13	3E-04	NA	3E-04	NA	3E-04	NA	NA	NA
7440-47-3	Chromium	14	2E-02	NA	8E-10	2E-02	NA	2E-02	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-03	NA	NA	1E-03	NA	NA	NA	NA	1E-03	NA	NA
7440-02-0	Nickel	19	4E-03	NA	9E-10	4E-03	NA	4E-03	NA	NA	NA	4E-03	NA
7782-49-2	Selenium	1.0	8E-04	NA	1E-08	8E-04	NA	NA	8E-04	NA	NA	NA	8E-04
7440-28-0	Thallium	0.50	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	11	1E-02	NA	2E-10	1E-02	NA	NA	NA	1E-02	NA	NA	NA
7440-62-2	Vanadium	26	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	2E-01	4E-05	5E-08	2E-01	7E-03	5E-02	1E-01	1E-02	1E-03	4E-03	1E-01
Resident (Subsurface Soil)													
7440-36-0	Antimony	4.5	4E-02	NA	NA	4E-02	4E-02	4E-02	NA	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	1.4	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	12	2E-02	NA	3E-10	2E-02	NA	NA	NA	2E-02	NA	NA	NA
		Total HIs:	3E-01	NA	3E-10	3E-01	4E-02	4E-02	3E-01	2E-02	NA	NA	3E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-26. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	1E-09	1E-09
7440-47-3	Chromium	14	1E-06	NA	1E-06	2E-06
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	4E-08	4E-08
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	1E-06	NA	1E-06	2E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	4E-11	4E-11
7440-47-3	Chromium	14	4E-07	NA	5E-08	5E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	2E-09	2E-09
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	4E-07	NA	6E-08	5E-07
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	4.5	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	1.4	NA	NA	NA	NA
7440-61-1	Uranium	12	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-6-26. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	2E-12	2E-12
7440-47-3	Chromium	14	2E-08	NA	2E-09	2E-08
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	6E-11	6E-11
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	2E-08	NA	2E-09	2E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	4.5	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	1.4	NA	NA	NA	NA
7440-61-1	Uranium	12	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Road Worker (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	2E-11	2E-11
7440-47-3	Chromium	14	1E-07	NA	2E-08	2E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	6E-10	6E-10
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	1E-07	NA	2E-08	2E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	4.5	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	1.4	NA	NA	NA	NA
7440-61-1	Uranium	12	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

Table F-6-26. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	3E-11	3E-11
7440-47-3	Chromium	14	3E-07	NA	4E-08	3E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	1E-09	1E-09
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	3E-07	NA	4E-08	3E-07
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	4.5	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	1.4	NA	NA	NA	NA
7440-61-1	Uranium	12	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	8E-14	8E-14
7440-47-3	Chromium	14	7E-08	NA	9E-11	7E-08
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	3E-12	3E-12
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	7E-08	NA	1E-10	7E-08

Table F-6-26. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-13

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	0.42	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-39-3	Barium	153	NA	NA	NA	NA
7440-43-9	Cadmium	0.08	NA	NA	3E-11	3E-11
7440-47-3	Chromium	14	5E-05	NA	9E-08	5E-05
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	19	NA	NA	1E-09	1E-09
7782-49-2	Selenium	1.0	NA	NA	NA	NA
7440-28-0	Thallium	0.50	NA	NA	NA	NA
7440-61-1	Uranium	11	NA	NA	NA	NA
7440-62-2	Vanadium	26	NA	NA	NA	NA
		Total CRs:	5E-05	NA	9E-08	5E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	4.5	NA	NA	NA	NA
7440-38-2	Arsenic	Not a COC	NA	NA	NA	NA
7440-28-0	Thallium	1.4	NA	NA	NA	NA
7440-61-1	Uranium	12	NA	NA	NA	NA
		Total CRs:	NA	NA	NA	NA

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	4.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	4E-04
7440-38-2	Arsenic	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	1.53E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-43-9	Cadmium	7.50E-02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	3E-05
7440-47-3	Chromium	1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7439-98-7	Molydenum	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	1E-04
7440-02-0	Nickel	1.90E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	4E-04
7782-49-2	Selenium	9.90E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	8E-05
7440-28-0	Thallium	5.00E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-02
7440-61-1	Uranium	1.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7440-62-2	Vanadium	2.60E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
																			Total HI_{ing} =		2E-02
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-43-9	Cadmium	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-47-3	Chromium	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-02-0	Nickel	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7782-49-2	Selenium	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-28-0	Thallium	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
7440-61-1	Uranium	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
7440-62-2	Vanadium	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
																			Total HI_{ing} =		3E-01
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-01
																			Total HI_{ing} =		4E-01

Table F-6-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-43-9	Cadmium	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-05
7440-47-3	Chromium	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	5E-05
7440-02-0	Nickel	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7782-49-2	Selenium	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-05
7440-28-0	Thallium	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-61-1	Uranium	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-03
7440-62-2	Vanadium	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
																		Total HI_{ing} =		1E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-61-1	Uranium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
																		Total HI_{ing} =		2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-38-2	Arsenic	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-43-9	Cadmium	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-47-3	Chromium	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	4E-04
7440-02-0	Nickel	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7782-49-2	Selenium	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-02
7440-61-1	Uranium	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-02
7440-62-2	Vanadium	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
																		Total HI_{ing} =		1E-01

Table F-6-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	**(**	**EPC**	**x**	**IR_s**	**x**	**FI**	**x**	**CF**	**x**	**EF**	**x**	**ED**	**x (1 /**	**RfD_o**	**)) / (**	**BW**	**x**	**AT_{nc}**	**) =**	**HQ_{ing}**
	Units:		**mg/kg**		**mg/day**		**unitless**		**mg/kg**		**days/yr**		**yr**		**mg/kg-day**		**kg**		**days**		**unitless**
CAS No.	**COC**																				
Road Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
7440-61-1	Uranium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-02
																				Total HI_{ing} =	1E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	(	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-43-9	Cadmium	(	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	6E-05
7440-47-3	Chromium	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	1E-04
7440-02-0	Nickel	(	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	4E-04
7782-49-2	Selenium	(	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	8E-05
7440-28-0	Thallium	(	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	4E-03
7440-61-1	Uranium	(	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-02
7440-62-2	Vanadium	(	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
																				Total HI_{ing} =	3E-02
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																					
7440-36-0	Antimony	(	4.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	5E-04
7440-38-2	Arsenic	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-61-1	Uranium	(	1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	3E-03
																				Total HI_{ing} =	4E-03

Table F-6-27. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(4.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	8E-05
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	(1.53E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7440-43-9	Cadmium	(7.50E-02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	6E-06
7440-47-3	Chromium	(1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	4E-04
7439-98-7	Molydenum	(1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-05
7440-02-0	Nickel	(1.90E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	) =	8E-05
7782-49-2	Selenium	(9.90E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-05
7440-28-0	Thallium	(5.00E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	2E-03
7440-61-1	Uranium	(1.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	3E-04
7440-62-2	Vanadium	(2.60E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	) =	4E-04
																			Total HI_{ing} =	3E-03

"---" - Value not available

IR_s - Soil ingestion rate

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

BW - Body weight

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	1.53E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	7.50E-02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	1E-06
7439-98-7	Molydenum	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.90E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.90E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.00E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.60E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	1E-06
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-07
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	0E+00

Table F-6-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	2E-08
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	0E+00
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(	4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(	1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	1E-07
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	1E-07

Table F-6-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																			
Road Worker (Subsurface Soil)																				
7440-36-0	Antimony	(4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(4.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(1.53E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7439-98-7	Molydenum	(1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.90E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.90E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	3E-07
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(4.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	0E+00

Table F-6-28. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																		
Recreational User/Trespasser (Surface Soil)																			
7440-36-0	Antimony	(4.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(1.53E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (4.43E+01	x	2.56E+04	) =	7E-08
7439-98-7	Molydenum	(1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.90E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.90E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.00E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (4.43E+01	x	2.56E+04	) =	NA
																		Total CR_{ing} =	7E-08

"---" - Value not available
IR_s - Soil ingestion rate
FI - Fraction of soil ingested from site
CF - Conversion factor
EF - Exposure frequency
SF_o - Oral cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{ing} - Cancer risk from ingestion
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-29. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x (1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(4.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	4E-03
7440-38-2	Arsenic	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	NA
7440-39-3	Barium	(1.53E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-01	)) /	9.49E+03	=	3E-03
7440-43-9	Cadmium	(7.50E-02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	1.00E-03	)) /	9.49E+03	=	3E-04
7440-47-3	Chromium	(1.40E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	2E-02
7439-98-7	Molydenum	(1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	1E-03
7440-02-0	Nickel	(1.90E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-02	)) /	9.49E+03	=	4E-03
7782-49-2	Selenium	(9.90E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	8E-04
7440-28-0	Thallium	(5.00E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	1E-01
7440-61-1	Uranium	(1.10E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	1E-02
7440-62-2	Vanadium	(2.60E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.04E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =	2E-01
Resident (Subsurface Soil)																
7440-36-0	Antimony	(4.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	4E-02
7440-38-2	Arsenic	(Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	NA
7440-28-0	Thallium	(1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	3E-01
7440-61-1	Uranium	(1.20E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =	3E-01

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-30. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	4.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	(	1.53E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	7.50E-02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	MOA	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	1.90E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	9.90E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	5.00E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	1.10E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	2.60E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	4.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	1.20E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	0E+00

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-31. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-32. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-13

		Equation:	(EPC	x	$IFSM_{adj}$	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	MR_{ing}
		Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(4.20E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(Not a COC	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	No	(1.53E+02	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	No	(7.50E-02	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	**Yes**	(1.40E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	4.6E-05
7439-98-7	Molydenum	No	(1.40E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	No	(1.90E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	No	(9.90E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(5.00E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(1.10E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	No	(2.60E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	4.6E-05
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(4.50E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(Not a COC	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(1.40E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(1.20E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	NA

"---" - Value not available

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

MR_{ing} - Mutagenic cancer risk from ingestion

NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

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Table F-6-33. Calculation of Age Adjusted Soil Ingestion Factor for Mutagenic Mode of Action - Resident

$IFSM_{adj}$	=	((	IR_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$	) /	BW_{0-2}	) + ((	IR_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$	) /	BW_{2-6}	) + ((	IR_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$	) /	BW_{6-16}	) + ((	IR_{16-26}	x	ED_{16-26}	x	$ADAF_{16-26}$	) /	BW_{16-26}	)
mg-year/kg-day			mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg	
4.77E+02	=	((	2.00E+02	x	2.00E+00	x	1.00E+01	) /	1.50E+01	) + ((	2.00E+02	x	4.00E+00	x	3.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	1.00E+01	x	3.00E+00	) /	8.00E+01	) + ((	1.00E+02	x	1.00E+01	x	1.00E+00	) /	8.00E+01	)

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity
IR_{s-cr} - Soil ingestion rate for child resident
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-34. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	(1 /	RfD$_d$	)) / (	BW	x	AT$_{nc}$	) =	HQ$_{derm}$
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr			mg/kg-day		kg		days		unitless
CAS No.	COC																						
Industrial Worker (Surface Soil) - Chronic Exposures																							
7440-36-0	Antimony	4.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-39-3	Barium	1.53E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	7.50E-02	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	1E-05
7440-47-3	Chromium	1.40E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	1.90E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	9.90E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	5.00E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	1.10E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	2.60E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																						Total HI$_{derm}$ =	1E-05
Construction Worker (Surface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-05
7440-47-3	Chromium	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																						Total HI$_{derm}$ =	5E-05
Construction Worker (Subsurface Soil) - Subchronic Exposures																							
7440-36-0	Antimony	4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																						Total HI$_{derm}$ =	0E+00

Table F-6-34. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-06
7440-47-3	Chromium	(1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-06
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-39-3	Barium	(1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-05
7440-47-3	Chromium	(1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	(1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	(9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-05

Table F-6-34. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	0E+00
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-39-3	Barium	(1.53E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	2.41E+03	) =	3E-06
7440-47-3	Chromium	(1.40E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(1.90E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(9.90E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(5.00E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(1.10E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	3E-06
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(4.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	0E+00

Table F-6-34. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	4.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-39-3	Barium	1.53E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	7.50E-02	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	4E-06
7440-47-3	Chromium	1.40E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	1.40E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	1.90E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	9.90E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	5.00E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	1.10E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	2.60E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	4E-06

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-35. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

		Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
		Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil)																						
7440-36-0	Antimony		(4.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium		(1.53E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium		(7.50E-02	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium		(1.40E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum		(1.40E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel		(1.90E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium		(9.90E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(5.00E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.10E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium		(2.60E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Construction Worker (Surface Soil)																						
7440-36-0	Antimony		(4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium		(1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium		(7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium		(1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum		(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel		(1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium		(9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium		(2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Construction Worker (Subsurface Soil)																						
7440-36-0	Antimony		(4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

Table F-6-35. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

		Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
		Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil)																						
7440-36-0	Antimony		(4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium		(1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium		(7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium		(1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum		(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel		(1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium		(9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium		(2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Utility Worker (Subsurface Soil)																						
7440-36-0	Antimony		(4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Road Worker (Surface Soil)																						
7440-36-0	Antimony		(4.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic		(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium		(1.53E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium		(7.50E-02	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium		(1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum		(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel		(1.90E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium		(9.90E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium		(5.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium		(1.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium		(2.60E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

Table F-6-35. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil)																						
7440-36-0	Antimony	(4.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Maintenance Worker (Surface Soil)																						
7440-36-0	Antimony	(4.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(1.53E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.40E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.90E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.90E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.00E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.10E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00
Maintenance Worker (Subsurface Soil)																						
7440-36-0	Antimony	(4.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

Table F-6-35. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil)																						
7440-36-0	Antimony	(4.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(Not a COC	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-39-3	Barium	(1.53E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.40E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.90E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.90E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(5.00E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(1.10E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	0E+00

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-36. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x (1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(4.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	NA
7440-39-3	Barium	(1.53E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(7.50E-02	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x (1 /	2.50E-05	)) /	9.49E+03	) =	4E-05
7440-47-3	Chromium	(1.40E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(1.90E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(9.90E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(5.00E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(1.10E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(2.60E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.31E-04	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	4E-05
Resident (Subsurface Soil)																
7440-36-0	Antimony	(4.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(1.20E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	0E+00

"---" - Value not available

DSF_{adj} - Age-adjusted dermal factor

CF - Conversion factor

EF - Exposure frequency

BW - Body weight

AT_{nc} - Noncarcinogenic averaging time

HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil

HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-37. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

	Equation:	(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
	Units:		mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	4.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	(	1.53E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	7.50E-02	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	MOA	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.90E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.90E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	5.00E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.10E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.60E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	4.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	Not a COC	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	1.20E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	0E+00

"---" - Value not available

DSF_{adj} - Age-adjusted dermal factor

CF - Conversion factor

EF - Exposure frequency

SF_d - Dermal cancer slope factor

BW - Body weight

AT_c - Carcinogenic averaging time

CR_{derm} - Cancer risk from dermal contact

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-38. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	=	(	(	**SA_{s-cr}**	x	**AF_{s-cr}**	x	**ED_{cr}**	)	/	**BW_c**	)	+	(	(	**SA_{s-ar}**	x	**AF_{s-ar}**	x	**ED_{ar}**	)	/	**BW_a**	)
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-39. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-13

		Equation:	(EPC	x	$DFSM_{adj}$	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	MR_{derm}
		Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(4.20E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(Not a COC	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	No	(1.53E+02	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	No	(7.50E-02	x	1.36E+03	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	**Yes**	(1.40E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	No	(1.40E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	No	(1.90E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	No	(9.90E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(5.00E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(1.10E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	No	(2.60E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(4.50E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(Not a COC	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(1.40E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(1.20E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA

"---" - Value not available

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity

CF - Conversion factor

EF - Exposure frequency

SF_d - Dermal cancer slope factor

AT_c - Carcinogenic averaging time

MR_{derm} - Mutagenic cancer risk from dermal contact

NA - CR not calculated because COC is not mutagenic, there is not available dermal absorption fraction and/or there is no available toxicity criterion.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-40. Calculation of Age Adjusted Soil Dermal Contact Factor for Mutagenic Mode of Action: Resident

$DFSM_{adj}$	=	((SA_{0-2}	x	AF_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$) /	BW_{0-2}) + ((	SA_{2-6}	x	AF_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$) /	BW_{2-6}) + ((	SA_{6-16}	x	AF_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$) /	BW_{6-16}) + ((	SA_{16-30}	x	AF_{16-30}	x	ED_{16-26}	x	$ADAF_{16-30}$) /	BW_{16-30})
mg-year/kg-day		cm^2/day		mg/cm^2		years		unitless	kg	cm^2/day		mg/cm^2		years		unitless	kg	cm^2/day		mg/cm^2		years		unitless	kg	cm^2/day		mg/cm^2		years		unitless	kg
1.36E+03	=	((2.69E+03	x	2.00E-01	x	2.00E+00	x	1.00E+01) /	1.50E+01) + ((	2.69E+03	x	2.00E-01	x	4.00E+00	x	3.00E+00) /	1.50E+01) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	3.00E+00) /	8.00E+01) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	1.00E+00) /	8.00E+01)

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity
SA_{0-2} - Skin surface area available for exposure for child resident, ages 0 to 2 Years
SA_{2-6} - Skin surface area available for exposure for child resident, ages 2 to 6 Years
SA_{6-16} - Skin surface area available for exposure for child resident, ages 6 to 16 Years
SA_{16-26} - Skin surface area available for exposure for adult resident, ages 16 to 26 Years
AF_{0-2} - Soil-to-skin adherence factor for child resident, ages 0 to 2 Years
AF_{2-6} - Soil-to-skin adherence factor for child resident, ages 2 to 6 Years
AF_{6-16} - Soil-to-skin adherence factor for child resident, ages 6 to 16 Years
AF_{16-26} - Soil-to-skin adherence factor for adult resident, ages 16 to 26 Years
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	4.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-38-2	Arsenic	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.50E-05	)) /	2.19E+05	=	NA
7440-39-3	Barium	1.53E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-04	)) /	2.19E+05	=	7E-03
7440-43-9	Cadmium	7.50E-02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-05	)) /	2.19E+05	=	2E-04
7440-47-3	Chromium	1.40E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-04	)) /	2.19E+05	=	3E-03
7439-98-7	Molydenum	1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-02-0	Nickel	1.90E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	9.00E-05	)) /	2.19E+05	=	5E-03
7782-49-2	Selenium	9.90E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) /	2.19E+05	=	1E-06
7440-28-0	Thallium	5.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
7440-61-1	Uranium	1.10E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-05	)) /	2.19E+05	=	6E-03
7440-62-2	Vanadium	2.60E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x (1 /	---	)) /	2.19E+05	=	NA
														Total HI_{inh} =		2E-02
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	4.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-39-3	Barium	1.53E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	7E-04
7440-43-9	Cadmium	7.50E-02	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	1.40E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	1.90E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	2E-03
7782-49-2	Selenium	9.90E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	5.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	1.10E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	3E-03
7440-62-2	Vanadium	2.60E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		5E-03

Table F-6-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x (1 /	PEF	) x	ET	x	EF	x	ED	x (1 /	RfC	)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	**COC**															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	4.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-28-0	Thallium	1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	3E-03
														Total HI_{inh} =		3E-03
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	4.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-39-3	Barium	1.53E+02	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	3E-05
7440-43-9	Cadmium	7.50E-02	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	1.40E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	1.90E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	9E-05
7782-49-2	Selenium	9.90E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	5.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	1.10E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	1E-04
7440-62-2	Vanadium	2.60E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		2E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	4.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	Not a COC	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	NA
7440-28-0	Thallium	1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	1E-04
														Total HI_{inh} =		1E-04

Table F-6-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(4.20E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	NA
7440-39-3	Barium	(1.53E+02	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 5.00E-03)) /		8.76E+03	=	3E-04
7440-43-9	Cadmium	(7.50E-02	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-47-3	Chromium	(1.40E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7439-98-7	Molydenum	(1.40E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-02-0	Nickel	(1.90E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 2.00E-04)) /		8.76E+03	=	8E-04
7782-49-2	Selenium	(9.90E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-28-0	Thallium	(5.00E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(1.10E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	9E-04
7440-62-2	Vanadium	(2.60E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
														Total HI_{inh} =		2E-03
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(4.50E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(Not a COC	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	NA
7440-28-0	Thallium	(1.40E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(1.20E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	1E-03
														Total HI_{inh} =		1E-03

Table F-6-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x (1 / PEF)	x ET	x EF	x ED	x (1 / RfC)) /	AT_{nc}	=	HQ_{inh}
	Units:	mg/kg	m^3/kg	hours/day	days/year	years	mg/m^3	hours		unitless
CAS No.	**COC**									
Maintenance Worker (Surface Soil) - Subchronic Exposures										
7440-36-0	Antimony	4.20E-01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-38-2	Arsenic	Not a COC	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 1.50E-05	5.78E+04	=	NA
7440-39-3	Barium	1.53E+02	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 5.00E-03	5.78E+04	=	7E-05
7440-43-9	Cadmium	7.50E-02	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-47-3	Chromium	1.40E+01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7439-98-7	Molydenum	1.40E+00	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-02-0	Nickel	1.90E+01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 2.00E-04	5.78E+04	=	2E-04
7782-49-2	Selenium	9.90E-01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-28-0	Thallium	5.00E-01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-61-1	Uranium	1.10E+01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 1.00E-04	5.78E+04	=	3E-04
7440-62-2	Vanadium	2.60E+01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
								Total HI_{inh}	=	6E-04
Maintenance Worker (Subsurface Soil) - Subchronic Exposures										
7440-36-0	Antimony	4.50E+00	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-38-2	Arsenic	Not a COC	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 1.50E-05	5.78E+04	=	NA
7440-28-0	Thallium	1.40E+00	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	---	5.78E+04	=	NA
7440-61-1	Uranium	1.20E+01	1 / 1.00E+07	8.00E+00	2.60E+01	6.60E+00	1 / 1.00E-04	5.78E+04	=	3E-04
								Total HI_{inh}	=	3E-04

Table F-6-41. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}																
	Units:	mg/kg		m^3/kg		hours/day		days/year		years				mg/m^3			hours			unitless
CAS No.	**COC**																			
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(	4.20E-01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-38-2	Arsenic	(	Not a COC	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.50E-05	)) /	7.88E+04	=	NA
7440-39-3	Barium	(	1.53E+02	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-04	)) /	7.88E+04	=	1E-06
7440-43-9	Cadmium	(	7.50E-02	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-05	)) /	7.88E+04	=	3E-08
7440-47-3	Chromium	(	1.40E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-04	)) /	7.88E+04	=	6E-07
7439-98-7	Molydenum	(	1.40E+00	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-02-0	Nickel	(	1.90E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	9.00E-05	)) /	7.88E+04	=	9E-07
7782-49-2	Selenium	(	9.90E-01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) /	7.88E+04	=	2E-10
7440-28-0	Thallium	(	5.00E-01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
7440-61-1	Uranium	(	1.10E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-05	)) /	7.88E+04	=	1E-06
7440-62-2	Vanadium	(	2.60E+01	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x (1 /	---	)) /	7.88E+04	=	NA
																Total HI_{inh} =		4E-06	

"---" - Value not available
ET - Exposure time
EF - Exposure frequency
AT_{nc} - Noncarcinogenic averaging time
HQ_{inh} - Hazard quotient for individual COC from inhalation
HI_{inh} - Hazard index summed over individual HQs from inhalation
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

Equation:		(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Industrial Worker (Surface Soil)																		
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.80E-03	)) /	6.13E+05	=	1E-09
7440-47-3	Chromium	(1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	1.20E-02	)) /	6.13E+05	=	1E-06
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	2.60E-04	)) /	6.13E+05	=	4E-08
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	2.50E+01	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-06
Construction Worker (Surface Soil)																		
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	4E-11
7440-47-3	Chromium	(1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	5E-08
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	2E-09
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	6E-08

Table F-6-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Construction Worker (Subsurface Soil)																		
7440-36-0	Antimony	(4.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00
Utility Worker (Surface Soil)																		
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-12
7440-47-3	Chromium	(1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	2E-09
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	6E-11
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	2E-09
Utility Worker (Subsurface Soil)																		
7440-36-0	Antimony	(4.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	2E-11
7440-47-3	Chromium	(1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	2E-08
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	6E-10
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	2E-08
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(4.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Maintenance Worker (Surface Soil)																		
7440-36-0	Antimony	4.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	1.53E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	7.50E-02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	3E-11
7440-47-3	Chromium	1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	4E-08
7439-98-7	Molydenum	1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	1.90E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	9.90E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	5.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	1.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	2.60E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	4E-08
Maintenance Worker (Subsurface Soil)																		
7440-36-0	Antimony	4.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	Not a COC	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	0E+00

Table F-6-42. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	8E-14
7440-47-3	Chromium	(1.40E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)) /	6.13E+05	=	9E-11
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	3E-12
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-10

"---" - Value not available

CF - Conversion factor

ET - Exposure time

EF - Exposure frequency

AT_c - Carcinogenic averaging time

CR_{inh} - Cancer risk from inhalation

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-43. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	RfC	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		mg/m^3		hours		unitless
CAS No.	**COC**																			
Resident (Surface Soil)																				
7440-36-0	Antimony	4.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	NA
7440-39-3	Barium	1.53E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	5.00E-04	)) /	2.28E+05	=	4E-08
7440-43-9	Cadmium	7.50E-02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-05	)) /	2.28E+05	=	4E-13
7440-47-3	Chromium	1.40E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-04	)) /	2.28E+05	=	8E-10
7439-98-7	Molydenum	1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	1.90E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	9.00E-05	)) /	2.28E+05	=	9E-10
7782-49-2	Selenium	9.90E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.00E-02	)) /	2.28E+05	=	1E-08
7440-28-0	Thallium	5.00E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	1.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	2E-10
7440-62-2	Vanadium	2.60E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																			Total HI_{inh} =	5E-08
Resident (Subsurface Soil)																				
7440-36-0	Antimony	4.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	NA
7440-28-0	Thallium	1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	1.20E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	3E-10
																			Total HI_{inh} =	3E-10

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-44. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

Equation:		(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	IUR	)) /	AT_c	=	CR_{inh}
Units:		mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		$(µg/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																			
Resident (Surface Soil)																				
7440-36-0	Antimony	(4.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	NA
7440-39-3	Barium	(1.53E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(7.50E-02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	3E-11
7440-47-3	Chromium	(MOA	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.90E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	1E-09
7782-49-2	Selenium	(9.90E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(5.00E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.60E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	1E-09
Resident (Subsurface Soil)																				
7440-36-0	Antimony	(4.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(Not a COC	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(1.20E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	0E+00

"---" - Value not available

CF - Conversion factor

ET - Exposure time

EF - Exposure frequency

ED_{cr} - Exposure duration for child

ED_{ar} - Exposure duration for adult

AT_c - Carcinogenic averaging time

CR_{inh} - Cancer risk from inhalation

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-45. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-13

		Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x ((	ED_{0-2}	x	$ADAF_{0-2}$	) + (	ED_{2-6}	x	$ADAF_{2-6}$	) + (	ED_{6-16}	x	$ADAF_{6-16}$	) + (	ED_{16-26}	x	$ADAF_{16-26}$	)) x	IUR	) /	AT_{c-inh}	=	MR_{inh}
		Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		unitless		years		unitless		years		unitless		years		unitless		$(µg/m^3)^{-1}$		hours		unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)																														
Resident (Surface Soil)																																
7440-36-0	Antimony	No	4.20E-01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-38-2	Arsenic	No	Not a COC	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	4.30E-03	) /	6.13E+05	=	NA
7440-39-3	Barium	No	1.53E+02	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-43-9	Cadmium	No	7.50E-02	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	1.80E-03	) /	6.13E+05	=	NA
7440-47-3	Chromium	**Yes**	1.40E+01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	1.20E-02	) /	6.13E+05	=	9.3E-08
7439-98-7	Molydenum	No	1.40E+00	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-02-0	Nickel	No	1.90E+01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	2.60E-04	) /	6.13E+05	=	NA
7782-49-2	Selenium	No	9.90E-01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-28-0	Thallium	No	5.00E-01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-61-1	Uranium	No	1.10E+01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-62-2	Vanadium	No	2.60E+01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
																															Total MR_{inh} =		9.3E-08
Resident (Subsurface Soil)																																
7440-36-0	Antimony	No	4.50E+00	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-38-2	Arsenic	No	Not a COC	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	4.30E-03	) /	6.13E+05	=	NA
7440-28-0	Thallium	No	1.40E+00	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
7440-61-1	Uranium	No	1.20E+01	x	1.00E+03	x	1.36E+09	x	1.84E+01	x	3.50E+02	x	2.00E+00	x	1.00E+01	+	4.00E+00	x	3.00E+00	+	1.00E+01	x	3.00E+00	+	1.00E+01	x	1.00E+00	) x	---	) /	6.13E+05	=	NA
																															Total MR_{inh} =		NA

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
AT_c - Carcinogenic averaging time
MR_{inh} - Mutagenic cancer risk from inhalation
NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

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Table F-6-46. Surface Soil EPCs for Metal COCs at IA-13

CAS No.	COC	Surface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	0.42
7440-38-2	Arsenic	Not a COC
7440-39-3	Barium	153
7440-43-9	Cadmium	0.075
7440-47-3	Chromium	14
7439-98-7	Molydenum	1.4
7440-02-0	Nickel	19
7782-49-2	Selenium	0.99
7440-28-0	Thallium	0.5
7440-61-1	Uranium	11
7440-62-2	Vanadium	26

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority* (USACE 2013o).

[b] Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-47. Subsurface Soil EPCs for Metal COCs at IA-13

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	4.5
7440-38-2	Arsenic	Not a COC
7440-28-0	Thallium	1.4
7440-61-1	Uranium	12

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority* (USACE 2013o).

[b] Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-48. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the Inhalation UR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

Table F-6-49. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Industrial Worker (Surface Soil)													
7440-36-0	Antimony	0.74	8E-04	NA	NA	8E-04	8E-04	8E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	6.70	1E-02	2E-03	1E-02	2E-02	2E-02	NA	2E-02	NA	NA	NA	NA
7440-39-3	Barium	142	3E-04	NA	6E-03	7E-03	7E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	1E-04	4E-05	6E-04	8E-04	NA	8E-04	NA	8E-04	NA	NA	NA
7440-47-3	Chromium	12	2E-03	NA	3E-03	4E-03	NA	4E-03	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-04	NA	NA	1E-04	NA	NA	NA	NA	1E-04	NA	NA
7440-02-0	Nickel	14	3E-04	NA	4E-03	4E-03	NA	4E-03	NA	NA	NA	4E-03	NA
7782-49-2	Selenium	0.9	8E-05	NA	1E-06	8E-05	NA	NA	8E-05	NA	NA	NA	8E-05
7440-28-0	Thallium	1.70	4E-02	NA	NA	4E-02	NA	NA	4E-02	NA	NA	NA	4E-02
7440-61-1	Uranium	6	9E-04	NA	3E-03	4E-03	NA	NA	NA	4E-03	NA	NA	NA
7440-62-2	Vanadium	21	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	5E-02	2E-03	3E-02	8E-02	3E-02	1E-02	6E-02	5E-03	1E-04	4E-03	4E-02
Construction Worker (Surface Soil)													
7440-36-0	Antimony	0.74	8E-03	NA	NA	8E-03	8E-03	8E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	9E-02	6E-03	1E-02	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-39-3	Barium	142	3E-03	NA	6E-04	4E-03	4E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	1E-03	2E-04	NA	1E-03	NA	1E-03	NA	1E-03	NA	NA	NA
7440-47-3	Chromium	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-03	NA	NA	1E-03	NA	NA	NA	NA	1E-03	NA	NA
7440-02-0	Nickel	14	3E-03	NA	2E-03	4E-03	NA	4E-03	NA	NA	NA	4E-03	NA
7782-49-2	Selenium	0.9	8E-04	NA	NA	8E-04	NA	NA	8E-04	NA	NA	NA	8E-04
7440-28-0	Thallium	1.70	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	6	1E-01	NA	1E-03	1E-01	NA	NA	NA	1E-01	NA	NA	NA
7440-62-2	Vanadium	21	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	4E-01	6E-03	1E-02	4E-01	1E-01	3E-02	2E-01	1E-01	1E-03	4E-03	1E-01
Construction Worker (Subsurface Soil)													
7440-36-0	Antimony	0.7	7E-03	NA	NA	7E-03	7E-03	7E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	9.1	1E-01	8E-03	1E-02	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-28-0	Thallium	1.7	1E-01	NA	NA	1E-01	NA	NA	1E-01	NA	NA	NA	1E-01
7440-61-1	Uranium	6	1E-01	NA	1E-03	1E-01	NA	NA	NA	1E-01	NA	NA	NA
		Total HIs:	4E-01	8E-03	2E-02	4E-01	2E-01	7E-03	3E-01	1E-01	NA	NA	1E-01

Table F-6-49. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Utility Worker (Surface Soil)													
7440-36-0	Antimony	0.74	3E-04	NA	NA	3E-04	3E-04	3E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	4E-03	2E-04	4E-04	4E-03	4E-03	NA	4E-03	NA	NA	NA	NA
7440-39-3	Barium	142	1E-04	NA	3E-05	1E-04	1E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	5E-05	7E-06	NA	5E-05	NA	5E-05	NA	5E-05	NA	NA	NA
7440-47-3	Chromium	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	5E-05	NA	NA	5E-05	NA	NA	NA	NA	5E-05	NA	NA
7440-02-0	Nickel	14	1E-04	NA	6E-05	2E-04	NA	2E-04	NA	NA	NA	2E-04	NA
7782-49-2	Selenium	0.9	3E-05	NA	NA	3E-05	NA	NA	3E-05	NA	NA	NA	3E-05
7440-28-0	Thallium	1.70	6E-03	NA	NA	6E-03	NA	NA	6E-03	NA	NA	NA	6E-03
7440-61-1	Uranium	6	5E-03	NA	5E-05	5E-03	NA	NA	NA	5E-03	NA	NA	NA
7440-62-2	Vanadium	21	7E-04	NA	NA	7E-04	NA	7E-04	NA	NA	NA	NA	NA
		Total HIs:	2E-02	2E-04	6E-04	2E-02	5E-03	1E-03	1E-02	5E-03	5E-05	2E-04	6E-03
Utility Worker (Subsurface Soil)													
7440-36-0	Antimony	0.7	3E-04	NA	NA	3E-04	3E-04	3E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	9	5E-03	3E-04	6E-04	6E-03	6E-03	NA	6E-03	NA	NA	NA	NA
7440-28-0	Thallium	1.7	6E-03	NA	NA	6E-03	NA	NA	6E-03	NA	NA	NA	6E-03
7440-61-1	Uranium	6	5E-03	NA	5E-05	5E-03	NA	NA	NA	5E-03	NA	NA	NA
		Total HIs:	2E-02	3E-04	6E-04	2E-02	6E-03	3E-04	1E-02	5E-03	NA	NA	6E-03
Road Worker (Surface Soil)													
7440-36-0	Antimony	0.74	3E-03	NA	NA	3E-03	3E-03	3E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	3E-02	2E-03	4E-03	4E-02	4E-02	NA	4E-02	NA	NA	NA	NA
7440-39-3	Barium	142	1E-03	NA	2E-04	1E-03	1E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	4E-04	7E-05	NA	5E-04	NA	5E-04	NA	5E-04	NA	NA	NA
7440-47-3	Chromium	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	4E-04	NA	NA	4E-04	NA	NA	NA	NA	4E-04	NA	NA
7440-02-0	Nickel	14	1E-03	NA	6E-04	2E-03	NA	2E-03	NA	NA	NA	2E-03	NA
7782-49-2	Selenium	0.9	3E-04	NA	NA	3E-04	NA	NA	3E-04	NA	NA	NA	3E-04
7440-28-0	Thallium	1.70	5E-02	NA	NA	5E-02	NA	NA	5E-02	NA	NA	NA	5E-02
7440-61-1	Uranium	6	4E-02	NA	5E-04	4E-02	NA	NA	NA	4E-02	NA	NA	NA
7440-62-2	Vanadium	21	6E-03	NA	NA	6E-03	NA	6E-03	NA	NA	NA	NA	NA
		Total HIs:	1E-01	2E-03	5E-03	1E-01	4E-02	1E-02	9E-02	5E-02	4E-04	2E-03	5E-02

Table F-6-49. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Road Worker (Subsurface Soil)													
7440-36-0	Antimony	0.7	3E-03	NA	NA	3E-03	3E-03	3E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	9	4E-02	3E-03	5E-03	5E-02	5E-02	NA	5E-02	NA	NA	NA	NA
7440-28-0	Thallium	1.7	5E-02	NA	NA	5E-02	NA	NA	5E-02	NA	NA	NA	5E-02
7440-61-1	Uranium	6	4E-02	NA	5E-04	4E-02	NA	NA	NA	4E-02	NA	NA	NA
		Total HIs:	1E-01	3E-03	5E-03	1E-01	6E-02	3E-03	1E-01	4E-02	NA	NA	5E-02
Maintenance Worker (Surface Soil)													
7440-36-0	Antimony	0.74	8E-04	NA	NA	8E-04	8E-04	8E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	1E-02	3E-04	1E-03	1E-02	1E-02	NA	1E-02	NA	NA	NA	NA
7440-39-3	Barium	142	3E-04	NA	7E-05	4E-04	4E-04	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	2E-04	1E-05	NA	3E-04	NA	3E-04	NA	3E-04	NA	NA	NA
7440-47-3	Chromium	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-04	NA	NA	1E-04	NA	NA	NA	NA	1E-04	NA	NA
7440-02-0	Nickel	14	3E-04	NA	2E-04	5E-04	NA	5E-04	NA	NA	NA	5E-04	NA
7782-49-2	Selenium	0.9	8E-05	NA	NA	8E-05	NA	NA	8E-05	NA	NA	NA	8E-05
7440-28-0	Thallium	1.70	1E-02	NA	NA	1E-02	NA	NA	1E-02	NA	NA	NA	1E-02
7440-61-1	Uranium	6	1E-02	NA	1E-04	1E-02	NA	NA	NA	1E-02	NA	NA	NA
7440-62-2	Vanadium	21	2E-03	NA	NA	2E-03	NA	2E-03	NA	NA	NA	NA	NA
		Total HIs:	4E-02	3E-04	1E-03	4E-02	1E-02	3E-03	3E-02	1E-02	1E-04	5E-04	1E-02
Maintenance Worker (Subsurface Soil)													
7440-36-0	Antimony	0.7	8E-05	NA	NA	8E-05	8E-05	8E-05	NA	NA	NA	NA	NA
7440-38-2	Arsenic	9	1E-03	4E-04	1E-03	3E-03	3E-03	NA	3E-03	NA	NA	NA	NA
7440-28-0	Thallium	1.7	2E-03	NA	NA	2E-03	NA	NA	2E-03	NA	NA	NA	2E-03
7440-61-1	Uranium	6	1E-03	NA	1E-04	1E-03	NA	NA	NA	1E-03	NA	NA	NA
		Total HIs:	4E-03	4E-04	2E-03	6E-03	3E-03	8E-05	5E-03	1E-03	NA	NA	2E-03

Table F-6-49. Summary of Noncancer Hazard Indices Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	HQs and HIs by Exposure Route			Total COC & Receptor HIs	Target Organ HIs (unitless)						
			Ingestion	Dermal Contact	Inhalation		Cardiovascular	Respiratory	Skin	Kidney	Skeletal	Immune	CNS
Recreational User/Trespasser (Surface Soil)													
7440-36-0	Antimony	0.74	1E-04	NA	NA	1E-04	1E-04	1E-04	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	2E-03	8E-04	2E-06	3E-03	3E-03	NA	3E-03	NA	NA	NA	NA
7440-39-3	Barium	142	6E-05	NA	1E-06	6E-05	6E-05	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	2E-05	1E-05	1E-07	4E-05	NA	4E-05	NA	4E-05	NA	NA	NA
7440-47-3	Chromium	12	3E-04	NA	5E-07	3E-04	NA	3E-04	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	2E-05	NA	NA	2E-05	NA	NA	NA	NA	2E-05	NA	NA
7440-02-0	Nickel	14	6E-05	NA	7E-07	6E-05	NA	6E-05	NA	NA	NA	6E-05	NA
7782-49-2	Selenium	0.9	1E-05	NA	2E-10	1E-05	NA	NA	1E-05	NA	NA	NA	1E-05
7440-28-0	Thallium	1.70	7E-03	NA	NA	7E-03	NA	NA	7E-03	NA	NA	NA	7E-03
7440-61-1	Uranium	6	2E-04	NA	7E-07	2E-04	NA	NA	NA	2E-04	NA	NA	NA
7440-62-2	Vanadium	21	3E-04	NA	NA	3E-04	NA	3E-04	NA	NA	NA	NA	NA
		Total HIs:	1E-02	9E-04	5E-06	1E-02	3E-03	9E-04	9E-03	2E-04	2E-05	6E-05	7E-03
Resident (Surface Soil)													
7440-36-0	Antimony	0.74	7E-03	NA	NA	7E-03	7E-03	7E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	7	9E-02	8E-03	5E-11	9E-02	9E-02	NA	9E-02	NA	NA	NA	NA
7440-39-3	Barium	142	3E-03	NA	4E-08	3E-03	3E-03	NA	NA	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	1E-03	1E-04	2E-12	1E-03	NA	1E-03	NA	1E-03	NA	NA	NA
7440-47-3	Chromium	12	2E-02	NA	6E-10	2E-02	NA	2E-02	NA	NA	NA	NA	NA
7439-98-7	Molydenum	1.4	1E-03	NA	NA	1E-03	NA	NA	NA	NA	1E-03	NA	NA
7440-02-0	Nickel	14	3E-03	NA	7E-10	3E-03	NA	3E-03	NA	NA	NA	3E-03	NA
7782-49-2	Selenium	0.9	7E-04	NA	1E-08	7E-04	NA	NA	7E-04	NA	NA	NA	7E-04
7440-28-0	Thallium	1.70	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	6	8E-03	NA	1E-10	8E-03	NA	NA	NA	8E-03	NA	NA	NA
7440-62-2	Vanadium	21	2E-02	NA	NA	2E-02	NA	2E-02	NA	NA	NA	NA	NA
		Total HIs:	5E-01	8E-03	5E-08	5E-01	1E-01	4E-02	4E-01	9E-03	1E-03	3E-03	3E-01
Resident (Subsurface Soil)													
7440-36-0	Antimony	0.7	7E-03	NA	NA	7E-03	7E-03	7E-03	NA	NA	NA	NA	NA
7440-38-2	Arsenic	9	1E-01	1E-02	7E-11	1E-01	1E-01	NA	1E-01	NA	NA	NA	NA
7440-28-0	Thallium	1.7	3E-01	NA	NA	3E-01	NA	NA	3E-01	NA	NA	NA	3E-01
7440-61-1	Uranium	6	7E-03	NA	1E-10	7E-03	NA	NA	NA	7E-03	NA	NA	NA
		Total HIs:	5E-01	1E-02	2E-10	5E-01	1E-01	7E-03	5E-01	7E-03	NA	NA	3E-01

NA - HQ and/or HI calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available or no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-50. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Industrial Worker (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	2E-06	4E-07	2E-07	2E-06
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	4E-09	4E-09
7440-47-3	Chromium	12	9E-07	NA	1E-06	2E-06
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	3E-08	3E-08
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
		Total CRs:	2E-06	4E-07	1E-06	4E-06
Construction Worker (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	6E-07	4E-08	9E-09	6E-07
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	2E-10	2E-10
7440-47-3	Chromium	12	4E-07	NA	5E-08	4E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	1E-09	1E-09
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
		Total CRs:	9E-07	4E-08	6E-08	1E-06
Construction Worker (Subsurface Soil)						
7440-36-0	Antimony	0.7	NA	NA	NA	NA
7440-38-2	Arsenic	9.1	8E-07	5E-08	1E-08	9E-07
7440-28-0	Thallium	1.7	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
		Total CRs:	8E-07	5E-08	1E-08	9E-07

Table F-6-50. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Utility Worker (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	2E-08	1E-09	4E-10	3E-08
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	7E-12	7E-12
7440-47-3	Chromium	12	1E-08	NA	2E-09	2E-08
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	5E-11	5E-11
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
	Total CRs:		4E-08	1E-09	2E-09	4E-08
Utility Worker (Subsurface Soil)						
7440-36-0	Antimony	0.7	NA	NA	NA	NA
7440-38-2	Arsenic	9	3E-08	2E-09	5E-10	3E-08
7440-28-0	Thallium	1.7	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
	Total CRs:		3E-08	2E-09	5E-10	3E-08
Road Worker (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	2E-07	1E-08	3E-09	2E-07
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	6E-11	6E-11
7440-47-3	Chromium	12	1E-07	NA	2E-08	1E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	4E-10	4E-10
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
	Total CRs:		3E-07	1E-08	2E-08	4E-07
Road Worker (Subsurface Soil)						
7440-36-0	Antimony	0.7	NA	NA	NA	NA
7440-38-2	Arsenic	9	3E-07	2E-08	5E-09	3E-07
7440-28-0	Thallium	1.7	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
	Total CRs:		3E-07	2E-08	5E-09	3E-07

Table F-6-50. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Maintenance Worker (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	4E-07	1E-08	6E-09	4E-07
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	1E-10	1E-10
7440-47-3	Chromium	12	2E-07	NA	3E-08	3E-07
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	8E-10	8E-10
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
		Total CRs:	6E-07	1E-08	4E-08	7E-07
Maintenance Worker (Subsurface Soil)						
7440-36-0	Antimony	0.7	NA	NA	NA	NA
7440-38-2	Arsenic	9	6E-07	2E-08	9E-09	6E-07
7440-28-0	Thallium	1.7	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
		Total CRs:	6E-07	2E-08	9E-09	6E-07
Recreational User/Trespasser (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	1E-07	5E-08	2E-11	2E-07
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	3E-13	3E-13
7440-47-3	Chromium	12	6E-08	NA	8E-11	6E-08
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	2E-12	2E-12
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
		Total CRs:	2E-07	5E-08	1E-10	2E-07

Table F-6-50. Summary of Cancer Risks Associated with Post-Remedial Metal COC Concentrations in Soil at IA-11

CAS No.	COC	EPC (mg/kg)	CRs by Exposure Route			Total COC & Receptor CRs
			Ingestion	Dermal Contact	Inhalation	
Resident (Surface Soil)						
7440-36-0	Antimony	0.74	NA	NA	NA	NA
7440-38-2	Arsenic	7	1E-05	4E-09	6E-09	1E-05
7440-39-3	Barium	142	NA	NA	NA	NA
7440-43-9	Cadmium	0.28	NA	NA	1E-10	1E-10
7440-47-3	Chromium	12	4E-05	NA	8E-08	4E-05
7439-98-7	Molydenum	1.4	NA	NA	NA	NA
7440-02-0	Nickel	14	NA	NA	7E-10	7E-10
7782-49-2	Selenium	0.9	NA	NA	NA	NA
7440-28-0	Thallium	1.70	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
7440-62-2	Vanadium	21	NA	NA	NA	NA
		Total CRs:	5E-05	4E-09	9E-08	5E-05
Resident (Subsurface Soil)						
7440-36-0	Antimony	0.7	NA	NA	NA	NA
7440-38-2	Arsenic	9	2E-05	5E-09	8E-09	2E-05
7440-28-0	Thallium	1.7	NA	NA	NA	NA
7440-61-1	Uranium	6	NA	NA	NA	NA
		Total CRs:	2E-05	5E-09	8E-09	2E-05

NA - CR calculation is not applicable for any of the following reasons: metal is not a COC; for the ingestion and inhalation routes, no toxicity criterion is available; for the dermal route, no toxicity criterion is available; no dermal absorption fraction is available.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Industrial Worker (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	7.40E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	4.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	8E-04
7440-38-2	Arsenic	6.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	1E-02
7440-39-3	Barium	1.42E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-01	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7440-43-9	Cadmium	2.80E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	1E-04
7440-47-3	Chromium	1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7439-98-7	Molydenum	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	1E-04
7440-02-0	Nickel	1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-02	)) / (	8.00E+01	x	9.13E+03	) =	3E-04
7782-49-2	Selenium	9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	8E-05
7440-28-0	Thallium	1.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	4E-02
7440-61-1	Uranium	6.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	9E-04
7440-62-2	Vanadium	2.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.04E-03	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
																			Total HI_{ing} =	5E-02
Construction Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-38-2	Arsenic	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	9E-02
7440-39-3	Barium	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-43-9	Cadmium	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-47-3	Chromium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-02-0	Nickel	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	8E-04
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-62-2	Vanadium	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	2E-02
																			Total HI_{ing} =	4E-01
Construction Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	7E-03
7440-38-2	Arsenic	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
7440-61-1	Uranium	5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	1E-01
																			Total HI_{ing} =	4E-01

Table F-6-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																			
Utility Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-38-2	Arsenic	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-03
7440-39-3	Barium	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7440-43-9	Cadmium	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	5E-05
7440-47-3	Chromium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	5E-05
7440-02-0	Nickel	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-04
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-05
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-61-1	Uranium	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-62-2	Vanadium	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	7E-04
																			Total HI_{ing} =	2E-02
Utility Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-38-2	Arsenic	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-61-1	Uranium	5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	5E-03
																			Total HI_{ing} =	2E-02
Road Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-38-2	Arsenic	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-02
7440-39-3	Barium	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7440-43-9	Cadmium	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	4E-04
7440-47-3	Chromium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	4E-04
7440-02-0	Nickel	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	3.65E+02	) =	1E-03
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-61-1	Uranium	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
7440-62-2	Vanadium	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
																			Total HI_{ing} =	1E-01

Table F-6-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Road Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-03
7440-38-2	Arsenic	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	5E-02
7440-61-1	Uranium	5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	4E-02
																			Total HI_{ing} =	1E-01
Maintenance Worker (Surface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	8E-04
7440-38-2	Arsenic	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-02
7440-39-3	Barium	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-01	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7440-43-9	Cadmium	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	2E-04
7440-47-3	Chromium	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	---	)) / (	8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	1E-04
7440-02-0	Nickel	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-02	)) / (	8.00E+01	x	2.41E+03	) =	3E-04
7782-49-2	Selenium	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	2.41E+03	) =	8E-05
7440-28-0	Thallium	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	1E-02
7440-61-1	Uranium	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-02
7440-62-2	Vanadium	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.04E-03	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
																			Total HI_{ing} =	4E-02
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																				
7440-36-0	Antimony	7.00E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	4.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	8E-05
7440-38-2	Arsenic	9.10E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
7440-28-0	Thallium	1.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	2.41E+03	) =	2E-03
7440-61-1	Uranium	5.50E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	2.41E+03	) =	1E-03
																			Total HI_{ing} =	4E-03

Table F-6-51. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x (1 /	RfD_o	)) / (	BW	x	AT_{nc}	) =	HQ_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	**COC**																			
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																				
7440-36-0	Antimony	(7.40E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	4.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	1E-04
7440-38-2	Arsenic	(6.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	2E-03
7440-39-3	Barium	(1.42E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-01	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7440-43-9	Cadmium	(2.80E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-05
7440-47-3	Chromium	(1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	3E-04
7439-98-7	Molydenum	(1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-05
7440-02-0	Nickel	(1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-02	)) / (	4.43E+01	x	3.29E+03	) =	6E-05
7782-49-2	Selenium	(9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	1E-05
7440-28-0	Thallium	(1.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	7E-03
7440-61-1	Uranium	(6.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	2E-04
7440-62-2	Vanadium	(2.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.04E-03	)) / (	4.43E+01	x	3.29E+03	) =	3E-04
																			Total HI_{ing} =	1E-02

"---" - Value not available

IR_s - Soil ingestion rate

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

BW - Body weight

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - CR calculation is not applicable.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																				
Industrial Worker (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-06
7440-39-3	Barium	(	1.42E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	9E-07
7439-98-7	Molydenum	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	2E-06
Construction Worker (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7440-39-3	Barium	(	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	9E-07
Construction Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	8E-07
7440-28-0	Thallium	(	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	8E-07

Table F-6-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Utility Worker (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-08
7440-39-3	Barium	(	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	1E-08
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	4E-08
Utility Worker (Subsurface Soil)																					
7440-36-0	Antimony	(	7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-08
7440-28-0	Thallium	(	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	3E-08
Road Worker (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-07
7440-39-3	Barium	(	1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	1E-07
7439-98-7	Molydenum	(	1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	3E-07

Table F-6-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:	mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	**COC**																			
Road Worker (Subsurface Soil)																				
7440-36-0	Antimony	(7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	3E-07
7440-28-0	Thallium	(1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	3E-07
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(7.40E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(6.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7440-39-3	Barium	(1.42E+02	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(2.80E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(1.20E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	5.00E-01	) / (	8.00E+01	x	2.56E+04	) =	2E-07
7439-98-7	Molydenum	(1.40E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(1.40E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(9.20E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(6.00E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(2.10E+01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-07
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(7.00E-01	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(9.10E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	6E-07
7440-28-0	Thallium	(1.70E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(5.50E+00	x	4.80E+02	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																			Total CR_{ing} =	6E-07

Table F-6-52. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(	EPC	x	IR_s	x	FI	x	CF	x	EF	x	ED	x	SF_o	) / (	BW	x	AT_c	) =	CR_{ing}
	Units:		mg/kg		mg/day		unitless		mg/kg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																				
Recreational User/Trespasser (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	1E-07
7440-39-3	Barium	(	1.42E+02	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	5.00E-01	) / (	4.43E+01	x	2.56E+04	) =	6E-08
7439-98-7	Molydenum	(	1.40E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	5.00E+01	x	1.00E+00	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																				Total CR_{ing} =	2E-07

"---" - Value not available

IR_s - Soil ingestion rate

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

BW - Body weight

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-53. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x (1 /	RfD_o	)) /	AT_{nc}	=	HQ_{ing}
	Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(7.40E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	7E-03
7440-38-2	Arsenic	(6.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	9E-02
7440-39-3	Barium	(1.42E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-01	)) /	9.49E+03	=	3E-03
7440-43-9	Cadmium	(2.80E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	1.00E-03	)) /	9.49E+03	=	1E-03
7440-47-3	Chromium	(1.20E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	2E-02
7439-98-7	Molydenum	(1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	1E-03
7440-02-0	Nickel	(1.40E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-02	)) /	9.49E+03	=	3E-03
7782-49-2	Selenium	(9.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	=	7E-04
7440-28-0	Thallium	(1.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	3E-01
7440-61-1	Uranium	(6.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	8E-03
7440-62-2	Vanadium	(2.10E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	5.04E-03	)) /	9.49E+03	=	2E-02
															Total HI_{ing} =	5E-01
Resident (Subsurface Soil)																
7440-36-0	Antimony	(7.00E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	4.00E-04	)) /	9.49E+03	=	7E-03
7440-38-2	Arsenic	(9.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	=	1E-01
7440-28-0	Thallium	(1.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	=	3E-01
7440-61-1	Uranium	(5.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	=	7E-03
															Total HI_{ing} =	5E-01

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

AT_{nc} - Noncarcinogenic averaging time

HQ_{ing} - Hazard quotient for individual COC from soil ingestion

HI_{ing} - Hazard index summed over individual HQs from soil ingestion

NA - HQ calculation is not applicable.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-54. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

	Equation:	(	EPC	x	IFS_{adj}	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	CR_{ing}
	Units:		mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	7.40E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	6.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	1E-05
7440-39-3	Barium	(	1.42E+02	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	(	2.80E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	(	MOA	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	NA
7439-98-7	Molydenum	(	1.40E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	(	1.40E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	(	9.20E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	(	1.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	6.00E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	(	2.10E+01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	1E-05
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	7.00E-01	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	(	9.10E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	2E-05
7440-28-0	Thallium	(	1.70E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	(	5.50E+00	x	1.05E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total CR =	2E-05

"---" - Value not available

IFS_{adj} - Age-adjusted soil ingestion factor

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

CR_{ing} - Cancer risk from ingestion

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-55. Calculation of Age-Adjusted Soil Ingestion Factor for Resident

IFS_{adj}	=	((	IR_{s-cr}	x	ED_{cr}	) /	BW_c	) + ((	IR_{s-ar}	x	ED_{ar}	) /	BW_a	)
mg-year/kg-day			**mg/day**		**years**		**kg**		**mg/day**		**years**		**kg**	
1.05E+02	=	((	2.00E+02	x	6.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	2.00E+01	) /	8.00E+01	)

IFS_{adj} - Age-adjusted soil ingestion factor
IR_{s-cr} - Soil ingestion rate for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-56. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Incidental Soil Ingestion at IA-11

		Equation:	(EPC	x	$IFSM_{adj}$	x	FI	x	CF	x	EF	x	SF_o	) /	AT_c	=	MR_{ing}
		Units:	mg/kg		mg-year/kg-day		unitless		mg/kg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(7.40E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(6.70E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-39-3	Barium	No	(1.42E+02	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-43-9	Cadmium	No	(2.80E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-47-3	Chromium	**Yes**	(1.20E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	5.00E-01	) /	2.56E+04	=	3.9E-05
7439-98-7	Molydenum	No	(1.40E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-02-0	Nickel	No	(1.40E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7782-49-2	Selenium	No	(9.20E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(1.70E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(6.00E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-62-2	Vanadium	No	(2.10E+01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	3.9E-05
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(7.00E-01	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-38-2	Arsenic	No	(9.10E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	=	NA
7440-28-0	Thallium	No	(1.70E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
7440-61-1	Uranium	No	(5.50E+00	x	4.77E+02	x	1.00E+00	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	=	NA
																Total MR_{ing} =	NA

"---" - Value not available

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity

FI - Fraction of soil ingested from site

CF - Conversion factor

EF - Exposure frequency

SF_o - Oral cancer slope factor

AT_c - Carcinogenic averaging time

MR_{ing} - Mutagenic cancer risk from ingestion

NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

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Table F-6-57. Calculation of Age Adjusted Soil Ingestion Factor for Mutigenic Mode of Action - Resident

$IFSM_{adj}$	=	((	IR_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$	) /	BW_{0-2}	) + ((	IR_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$	) /	BW_{2-6}	) + ((	IR_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$	) /	BW_{6-16}	) + ((	IR_{16-26}	x	ED_{16-26}	x	$ADAF_{16-26}$	) /	BW_{16-26}	)
mg-year/kg-day			mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg		mg/day		years		unitless		kg	
4.77E+02	=	((	2.00E+02	x	2.00E+00	x	1.00E+01	) /	1.50E+01	) + ((	2.00E+02	x	4.00E+00	x	3.00E+00	) /	1.50E+01	) + ((	1.00E+02	x	1.00E+01	x	3.00E+00	) /	8.00E+01	) + ((	1.00E+02	x	1.00E+01	x	1.00E+00	) /	8.00E+01	)

$IFSM_{adj}$ - Age-adjusted soil ingestion factor for mutagenicity
IR_{s-cr} - Soil ingestion rate for child resident
IR_{s-ar} - Soil ingestion rate for adult resident
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-58. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	6.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	2E-03
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.40E-02	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	4E-05
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	7.50E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	8.00E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	5.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	2.00E-05	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	3.00E-03	)) / (	8.00E+01	x	9.13E+03	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x (1 /	1.31E-04	)) / (	8.00E+01	x	9.13E+03	) =	NA
																					Total HI_{derm} =	2E-03
Construction Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	6E-03
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	6E-03
Construction Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	8E-03
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	8E-03

Table F-6-58. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Utility Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-04
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	7E-06
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	3E-04
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-04
Road Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	6.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	3.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	2E-03
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.40E-02	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.25E-05	)) / (	8.00E+01	x	3.65E+02	) =	7E-05
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	---	)) / (	8.00E+01	x	3.65E+02	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	8.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	5.00E-05	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x (1 /	1.31E-04	)) / (	8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	2E-03

Table F-6-58. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC x SA x AF x ABS x CF x EF x ED x (1 / RfD_d)) / (BW x AT_{nc}) = HQ_{derm}																				
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Road Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	(1 / 6.00E-05	)) /	(8.00E+01	x	3.65E+02	) =	NA
7440-38-2	Arsenic	(9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	(1 / 3.00E-04	)) /	(8.00E+01	x	3.65E+02	) =	3E-03
7440-28-0	Thallium	(1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	(1 / 5.00E-05	)) /	(8.00E+01	x	3.65E+02	) =	NA
7440-61-1	Uranium	(5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	(1 / 2.00E-04	)) /	(8.00E+01	x	3.65E+02	) =	NA
																					Total HI_{derm} =	3E-03
Maintenance Worker (Surface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(7.40E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 6.00E-05	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(6.70E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 3.00E-04	)) /	(8.00E+01	x	2.41E+03	) =	3E-04
7440-39-3	Barium	(1.42E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 1.40E-02	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-43-9	Cadmium	(2.80E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 1.25E-05	)) /	(8.00E+01	x	2.41E+03	) =	1E-05
7440-47-3	Chromium	(1.20E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / ---	)) /	(8.00E+01	x	2.41E+03	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 5.00E-03	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-02-0	Nickel	(1.40E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 8.00E-04	)) /	(8.00E+01	x	2.41E+03	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 5.00E-03	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-28-0	Thallium	(1.70E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 5.00E-05	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(6.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 2.00E-04	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-62-2	Vanadium	(2.10E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 1.31E-04	)) /	(8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	3E-04
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																						
7440-36-0	Antimony	(7.00E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 6.00E-05	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-38-2	Arsenic	(9.10E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 3.00E-04	)) /	(8.00E+01	x	2.41E+03	) =	4E-04
7440-28-0	Thallium	(1.70E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 5.00E-05	)) /	(8.00E+01	x	2.41E+03	) =	NA
7440-61-1	Uranium	(5.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	(1 / 2.00E-04	)) /	(8.00E+01	x	2.41E+03	) =	NA
																					Total HI_{derm} =	4E-04

Table F-6-58. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x (1 /	RfD_d	)) / (	BW	x	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		mg/kg-day		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																						
7440-36-0	Antimony	(7.40E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	6.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-38-2	Arsenic	(6.70E+00	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	8E-04
7440-39-3	Barium	(1.42E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.40E-02	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-43-9	Cadmium	(2.80E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	1E-05
7440-47-3	Chromium	(1.20E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	7.50E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-02-0	Nickel	(1.40E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	8.00E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
7782-49-2	Selenium	(9.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	5.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-28-0	Thallium	(1.70E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	2.00E-05	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-61-1	Uranium	(6.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	3.00E-03	)) / (	4.43E+01	x	3.29E+03	) =	NA
7440-62-2	Vanadium	(2.10E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x (1 /	1.31E-04	)) / (	4.43E+01	x	3.29E+03	) =	NA
																					Total HI_{derm} =	9E-04

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
BW - Body weight
AT_{nc} - Noncarcinogenic averaging time
HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil
HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-59. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

Equation:		(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Industrial Worker (Surface Soil)																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	1.20E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-07
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	1.20E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	1.20E-01	x	---	x	1.00E-06	x	2.50E+02	x	2.50E+01	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	4E-07
Construction Worker (Surface Soil)																						
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	4E-08
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	4E-08
Construction Worker (Subsurface Soil)																						
7440-36-0	Antimony	7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	5E-08
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	2.50E+02	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	5E-08

Table F-6-59. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(	EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:		mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																						
Utility Worker (Surface Soil)																							
7440-36-0	Antimony	(	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-09
7440-39-3	Barium	(	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	1E-09
Utility Worker (Subsurface Soil)																							
7440-36-0	Antimony	(	7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	2E-09
7440-28-0	Thallium	(	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	1.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	2E-09
Road Worker (Surface Soil)																							
7440-36-0	Antimony	(	7.40E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	) / (	8.00E+01	x	2.56E+04	) =	1E-08
7440-39-3	Barium	(	1.42E+02	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	3.47E+03	x	2.80E-01	x	1.00E-03	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	(	1.20E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	2.00E+01	) / (	8.00E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	(	1.40E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	) / (	8.00E+01	x	2.56E+04	) =	NA
																						Total CR_{derm} =	1E-08

Table F-6-59. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$	kg		days		unitless
CAS No.	COC																				
Road Worker (Subsurface Soil)																					
7440-36-0	Antimony	7.00E-01	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-38-2	Arsenic	9.10E+00	x	3.47E+03	x	2.80E-01	x	3.00E-02	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	1.50E+00	8.00E+01	x	2.56E+04	=	2E-08
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-61-1	Uranium	5.50E+00	x	3.47E+03	x	2.80E-01	x	---	x	1.00E-06	x	9.00E+01	x	1.00E+00	x	---	8.00E+01	x	2.56E+04	=	NA
																			Total CR_{derm} =		2E-08
Maintenance Worker (Surface Soil)																					
7440-36-0	Antimony	7.40E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-38-2	Arsenic	6.70E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	8.00E+01	x	2.56E+04	=	1E-08
7440-39-3	Barium	1.42E+02	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-43-9	Cadmium	2.80E-01	x	3.47E+03	x	1.60E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-47-3	Chromium	1.20E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	2.00E+01	8.00E+01	x	2.56E+04	=	NA
7439-98-7	Molydenum	1.40E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-02-0	Nickel	1.40E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7782-49-2	Selenium	9.20E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-61-1	Uranium	6.00E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-62-2	Vanadium	2.10E+01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
																			Total CR_{derm} =		1E-08
Maintenance Worker (Subsurface Soil)																					
7440-36-0	Antimony	7.00E-01	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-38-2	Arsenic	9.10E+00	x	3.47E+03	x	1.60E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	1.50E+00	8.00E+01	x	2.56E+04	=	2E-08
7440-28-0	Thallium	1.70E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
7440-61-1	Uranium	5.50E+00	x	3.47E+03	x	1.60E-01	x	---	x	1.00E-06	x	2.60E+01	x	6.60E+00	x	---	8.00E+01	x	2.56E+04	=	NA
																			Total CR_{derm} =		2E-08

Table F-6-59. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	SA	x	AF	x	ABS	x	CF	x	EF	x	ED	x	SF_d	) / (	BW	x	AT_c	) =	CR_{derm}
	Units:	mg/kg		cm^2		mg/cm^2		unitless		kg/mg		days/yr		yr		$(mg/kg\text{-}day)^{-1}$		kg		days		unitless
CAS No.	COC																					
Recreational User/Trespasser (Surface Soil)																						
7440-36-0	Antimony	7.40E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-38-2	Arsenic	6.70E+00	x	7.17E+03	x	1.10E-01	x	3.00E-02	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	1.50E+00	) / (	4.43E+01	x	2.56E+04	) =	5E-08
7440-39-3	Barium	1.42E+02	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-43-9	Cadmium	2.80E-01	x	7.17E+03	x	1.10E-01	x	1.00E-03	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-47-3	Chromium	1.20E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	2.00E+01	) / (	4.43E+01	x	2.56E+04	) =	NA
7439-98-7	Molydenum	1.40E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-02-0	Nickel	1.40E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7782-49-2	Selenium	9.20E-01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-28-0	Thallium	1.70E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-61-1	Uranium	6.00E+00	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
7440-62-2	Vanadium	2.10E+01	x	7.17E+03	x	1.10E-01	x	---	x	1.00E-06	x	2.60E+01	x	9.00E+00	x	---	) / (	4.43E+01	x	2.56E+04	) =	NA
																					Total CR_{derm} =	5E-08

"---" - Value not available
SA - Skin surface area
CF - Conversion factor
EF - Exposure frequency
SF_d - Dermal cancer slope factor
BW - Body weight
AT_c - Carcinogenic averaging time
CR_{derm} - Cancer risk from dermal contact
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-60. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x (1 /	RfD_d	)) /	AT_{nc}	) =	HQ_{derm}
	Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		mg/kg-day		days		unitless
CAS No.	**COC**															
Resident (Surface Soil)																
7440-36-0	Antimony	(7.40E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(6.70E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	8E-03
7440-39-3	Barium	(1.42E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.40E-02	)) /	9.49E+03	) =	NA
7440-43-9	Cadmium	(2.80E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x (1 /	2.50E-05	)) /	9.49E+03	) =	1E-04
7440-47-3	Chromium	(1.20E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	7.50E-05	)) /	9.49E+03	) =	NA
7439-98-7	Molydenum	(1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-02-0	Nickel	(1.40E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	8.00E-04	)) /	9.49E+03	) =	NA
7782-49-2	Selenium	(9.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	5.00E-03	)) /	9.49E+03	) =	NA
7440-28-0	Thallium	(1.70E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(6.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
7440-62-2	Vanadium	(2.10E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	1.31E-04	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	8E-03
Resident (Subsurface Soil)																
7440-36-0	Antimony	(7.00E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	6.00E-05	)) /	9.49E+03	) =	NA
7440-38-2	Arsenic	(9.10E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-04	)) /	9.49E+03	) =	1E-02
7440-28-0	Thallium	(1.70E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	2.00E-05	)) /	9.49E+03	) =	NA
7440-61-1	Uranium	(5.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x (1 /	3.00E-03	)) /	9.49E+03	) =	NA
															Total HI_{derm} =	1E-02

"---" - Value not available

DSF_{adj} - Age-adjusted dermal factor

CF - Conversion factor

EF - Exposure frequency

BW - Body weight

AT_{nc} - Noncarcinogenic averaging time

HQ_{derm} - Hazard quotient for individual COC from dermal contat with soil

HI_{derm} - Hazard index summed over individual HQs from dermal contact with soil

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-61. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

	Equation:	(	EPC	x	DFS_{adj}	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	CR_{derm}
	Units:		mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC																
Resident (Surface Soil)																	
7440-36-0	Antimony	(	7.40E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	6.70E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	4E-09
7440-39-3	Barium	(	1.42E+02	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	(	2.80E-01	x	3.21E+02	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	(	MOA	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	(	1.40E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	(	1.40E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	(	9.20E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	(	1.70E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	6.00E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	(	2.10E+01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	4E-09
Resident (Subsurface Soil)																	
7440-36-0	Antimony	(	7.00E-01	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	(	9.10E+00	x	3.21E+02	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	5E-09
7440-28-0	Thallium	(	1.70E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	(	5.50E+00	x	3.21E+02	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total CR_{derm} =	5E-09

"---" - Value not available

DSF_{adj} - Age-adjusted dermal factor

CF - Conversion factor

EF - Exposure frequency

SF_d - Dermal cancer slope factor

BW - Body weight

AT_c - Carcinogenic averaging time

CR_{derm} - Cancer risk from dermal contact

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-62. Calculation of Age-Adjusted Soil Dermal Contact Factor for Resident

DFSadj	=	(	(	**SA_{s-cr}**	x	**AF_{s-cr}**	x	**ED_{cr}**	)	/	**BW_c**	)	+	(	(	**SA_{s-ar}**	x	**AF_{s-ar}**	x	**ED_{ar}**	)	/	**BW_a**	)
mg-year/kg-day				**cm^2/day**		**mg/cm^2**		**years**			**kg**					**cm^2/day**		**mg/cm^2**		**years**			**kg**	
3.21E+02	=	(	(	2.69E+03	x	2.00E-01	x	6.00E+00	)	/	1.50E+01	)	+	(	(	6.03E+03	x	7.00E-02	x	2.00E+01	)	/	8.00E+01	)

DSF_{adj} - Age-adjusted dermal factor
SA_{s-cr} - Skin surface area for child resident
AF_{s-cr} - Soil to skin adherence factor for child resident
ED_{cr} - Exposure duration for child resident
BW_c - Child body weight
SA_{s-ar} - Skin surface area for adult resident
AF_{s-ar} - Soil to skin adherence factor for adult resident
ED_{ar} - Exposure duration for adult resident
BW_a - Adult body weight

Table F-6-63. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Dermal Contact with Soil at IA-11

		Equation:	(EPC	x	$DFSM_{adj}$	x	ABS	x	CF	x	EF	x	SF_d	) /	AT_c	) =	MR_{derm}
		Units:	mg/kg		mg-year/kg-day		unitless		kg/mg		days/yr		$(mg/kg\text{-}day)^{-1}$		days		unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)															
Resident (Surface Soil)																	
7440-36-0	Antimony	No	(7.40E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(6.70E+00	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-39-3	Barium	No	(1.42E+02	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-43-9	Cadmium	No	(2.80E-01	x	1.36E+03	x	1.00E-03	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-47-3	Chromium	**Yes**	(1.20E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	2.00E+01	) /	2.56E+04	) =	NA
7439-98-7	Molydenum	No	(1.40E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-02-0	Nickel	No	(1.40E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7782-49-2	Selenium	No	(9.20E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(1.70E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(6.00E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-62-2	Vanadium	No	(2.10E+01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA
Resident (Subsurface Soil)																	
7440-36-0	Antimony	No	(7.00E-01	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-38-2	Arsenic	No	(9.10E+00	x	1.36E+03	x	3.00E-02	x	1.00E-06	x	3.50E+02	x	1.50E+00	) /	2.56E+04	) =	NA
7440-28-0	Thallium	No	(1.70E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
7440-61-1	Uranium	No	(5.50E+00	x	1.36E+03	x	---	x	1.00E-06	x	3.50E+02	x	---	) /	2.56E+04	) =	NA
																Total MR_{derm} =	NA

"---" - Value not available

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity

CF - Conversion factor

EF - Exposure frequency

SF_d - Dermal cancer slope factor

AT_c - Carcinogenic averaging time

MR_{derm} - Mutagenic cancer risk from dermal contact

NA - CR not calculated because COC is not mutagenic, there is not available dermal absorption fraction and/or there is no available toxicity criterion.

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-64. Calculation of Age Adjusted Soil Dermal Contact Factor for Mutagenic Mode of Action: Resident

$DFSM_{adj}$	=	((	SA_{0-2}	x	AF_{0-2}	x	ED_{0-2}	x	$ADAF_{0-2}$	) /	BW_{0-2}	) + ((	SA_{2-6}	x	AF_{2-6}	x	ED_{2-6}	x	$ADAF_{2-6}$	) /	BW_{2-6}	) + ((	SA_{6-16}	x	AF_{6-16}	x	ED_{6-16}	x	$ADAF_{6-16}$	) /	BW_{6-16}	) + ((	SA_{16-30}	x	AF_{16-30}	x	ED_{16-26}	x	$ADAF_{16-30}$	) /	BW_{16-30}	)
mg-year/kg-day			cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg		cm^2/day		mg/cm^2		years		unitless		kg	
1.36E+03	=	((	2.69E+03	x	2.00E-01	x	2.00E+00	x	1.00E+01	) /	1.50E+01	) + ((	2.69E+03	x	2.00E-01	x	4.00E+00	x	3.00E+00	) /	1.50E+01	) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	3.00E+00	) /	8.00E+01	) + ((	6.03E+03	x	7.00E-02	x	1.00E+01	x	1.00E+00	) /	8.00E+01	)

$DFSM_{adj}$ - Age-adjusted soil dermal factor for mutagenicity
SA_{0-2} - Skin surface area available for exposure for child resident, ages 0 to 2 Years
SA_{2-6} - Skin surface area available for exposure for child resident, ages 2 to 6 Years
SA_{6-16} - Skin surface area available for exposure for child resident, ages 6 to 16 Years
SA_{16-26} - Skin surface area available for exposure for adult resident, ages 16 to 26 Years
AF_{0-2} - Soil-to-skin adherence factor for child resident, ages 0 to 2 Years
AF_{2-6} - Soil-to-skin adherence factor for child resident, ages 2 to 6 Years
AF_{6-16} - Soil-to-skin adherence factor for child resident, ages 6 to 16 Years
AF_{16-26} - Soil-to-skin adherence factor for adult resident, ages 16 to 26 Years
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
BW_{0-2} - Body weight for child resident, ages 0 to 2 years
BW_{2-6} - Body weight for child resident, ages 2 to 6 years
BW_{6-16} - Body weight for child resident, ages 6 to 16 years
BW_{16-26} - Body weight for adult resident, ages 16 to 26 years

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Table F-6-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Industrial Worker (Surface Soil) - Chronic Exposures																
7440-36-0	Antimony	(7.40E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	---)) /	2.19E+05	=	NA
7440-38-2	Arsenic	(6.70E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	1.50E-05)) /	2.19E+05	=	1E-02
7440-39-3	Barium	(1.42E+02	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	5.00E-04)) /	2.19E+05	=	6E-03
7440-43-9	Cadmium	(2.80E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	1.00E-05)) /	2.19E+05	=	6E-04
7440-47-3	Chromium	(1.20E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	1.00E-04)) /	2.19E+05	=	3E-03
7439-98-7	Molydenum	(1.40E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	---)) /	2.19E+05	=	NA
7440-02-0	Nickel	(1.40E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	9.00E-05)) /	2.19E+05	=	4E-03
7782-49-2	Selenium	(9.20E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	2.00E-02)) /	2.19E+05	=	1E-06
7440-28-0	Thallium	(1.70E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	---)) /	2.19E+05	=	NA
7440-61-1	Uranium	(6.00E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	4.00E-05)) /	2.19E+05	=	3E-03
7440-62-2	Vanadium	(2.10E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	2.50E+01	x	(1 /	---)) /	2.19E+05	=	NA
														Total HI_{inh} =		3E-02
Construction Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.40E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(6.70E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	1.50E-05)) /	8.76E+03	=	1E-02
7440-39-3	Barium	(1.42E+02	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	5.00E-03)) /	8.76E+03	=	6E-04
7440-43-9	Cadmium	(2.80E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7440-47-3	Chromium	(1.20E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(1.40E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.40E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	2.00E-04)) /	8.76E+03	=	2E-03
7782-49-2	Selenium	(9.20E-01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.70E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
7440-61-1	Uranium	(6.00E+00	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	1.00E-04)) /	8.76E+03	=	1E-03
7440-62-2	Vanadium	(2.10E+01	x	(1 /	1.00E+07)	x 8.00E+00	x	2.50E+02	x	1.00E+00	x	(1 /	---)) /	8.76E+03	=	NA
														Total HI_{inh} =		1E-02

Table F-6-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Construction Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	1E-02
7440-28-0	Thallium	(1.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(5.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.50E+02	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	1E-03
														Total HI_{inh} =		2E-02
Utility Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.40E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(6.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	4E-04
7440-39-3	Barium	(1.42E+02	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	5.00E-03	)) /	8.76E+03	=	3E-05
7440-43-9	Cadmium	(2.80E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-47-3	Chromium	(1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7439-98-7	Molydenum	(1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-02-0	Nickel	(1.40E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	2.00E-04	)) /	8.76E+03	=	6E-05
7782-49-2	Selenium	(9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-28-0	Thallium	(1.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(6.00E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	5E-05
7440-62-2	Vanadium	(2.10E+01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
														Total HI_{inh} =		6E-04
Utility Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-38-2	Arsenic	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.50E-05	)) /	8.76E+03	=	6E-04
7440-28-0	Thallium	(1.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	---	)) /	8.76E+03	=	NA
7440-61-1	Uranium	(5.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	1.00E+01	x	1.00E+00	x (1 /	1.00E-04	)) /	8.76E+03	=	5E-05
														Total HI_{inh} =		6E-04

Table F-6-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Road Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.40E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(6.70E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	4E-03
7440-39-3	Barium	(1.42E+02	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 5.00E-03)) /		8.76E+03	=	2E-04
7440-43-9	Cadmium	(2.80E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-47-3	Chromium	(1.20E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7439-98-7	Molydenum	(1.40E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-02-0	Nickel	(1.40E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 2.00E-04)) /		8.76E+03	=	6E-04
7782-49-2	Selenium	(9.20E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-28-0	Thallium	(1.70E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(6.00E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	5E-04
7440-62-2	Vanadium	(2.10E+01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
														Total HI_{inh} =		5E-03
Road Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.00E-01	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-38-2	Arsenic	(9.10E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.50E-05)) /		8.76E+03	=	5E-03
7440-28-0	Thallium	(1.70E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / ---)) /		8.76E+03	=	NA
7440-61-1	Uranium	(5.50E+00	x	(1 / 1.00E+07)	x	8.00E+00	x	9.00E+01	x	1.00E+00	x	(1 / 1.00E-04)) /		8.76E+03	=	5E-04
														Total HI_{inh} =		5E-03

Table F-6-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}														
	Units:	mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless
CAS No.	COC															
Maintenance Worker (Surface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.40E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(6.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	1E-03
7440-39-3	Barium	(1.42E+02	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	5.00E-03	)) /	5.78E+04	=	7E-05
7440-43-9	Cadmium	(2.80E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-47-3	Chromium	(1.20E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7439-98-7	Molydenum	(1.40E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-02-0	Nickel	(1.40E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	2.00E-04	)) /	5.78E+04	=	2E-04
7782-49-2	Selenium	(9.20E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-28-0	Thallium	(1.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(6.00E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	1E-04
7440-62-2	Vanadium	(2.10E+01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
														Total HI_{inh} =		1E-03
Maintenance Worker (Subsurface Soil) - Subchronic Exposures																
7440-36-0	Antimony	(7.00E-01	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-38-2	Arsenic	(9.10E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.50E-05	)) /	5.78E+04	=	1E-03
7440-28-0	Thallium	(1.70E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	---	)) /	5.78E+04	=	NA
7440-61-1	Uranium	(5.50E+00	x (1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x (1 /	1.00E-04	)) /	5.78E+04	=	1E-04
														Total HI_{inh} =		2E-03

Table F-6-65. Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

Equation:		(EPC x (1 / PEF) x ET x EF x ED x (1 / RfC)) / AT_{nc} = HQ_{inh}															
Units:		mg/kg		m^3/kg		hours/day		days/year		years		mg/m^3		hours		unitless	
CAS No.	COC																
Recreational User/Trespasser (Surface Soil) - Chronic Exposures																	
7440-36-0	Antimony	(7.40E-01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA	
7440-38-2	Arsenic	(6.70E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.50E-05)) /		7.88E+04	=	2E-06	
7440-39-3	Barium	(1.42E+02	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 5.00E-04)) /		7.88E+04	=	1E-06	
7440-43-9	Cadmium	(2.80E-01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.00E-05)) /		7.88E+04	=	1E-07	
7440-47-3	Chromium	(1.20E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 1.00E-04)) /		7.88E+04	=	5E-07	
7439-98-7	Molydenum	(1.40E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA	
7440-02-0	Nickel	(1.40E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 9.00E-05)) /		7.88E+04	=	7E-07	
7782-49-2	Selenium	(9.20E-01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 2.00E-02)) /		7.88E+04	=	2E-10	
7440-28-0	Thallium	(1.70E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA	
7440-61-1	Uranium	(6.00E+00	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / 4.00E-05)) /		7.88E+04	=	7E-07	
7440-62-2	Vanadium	(2.10E+01	x	(1 / 1.36E+09)	x	2.00E+00	x	2.60E+01	x	9.00E+00	x	(1 / ---)) /		7.88E+04	=	NA	
														Total HI_{inh} =		5E-06	

"---" - Value not available

ET - Exposure time

EF - Exposure frequency

AT_{nc} - Noncarcinogenic averaging time

HQ_{inh} - Hazard quotient for individual COC from inhalation

HI_{inh} - Hazard index summed over individual HQs from inhalation

NA - HQ calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC	x CF	(1 / PEF)	x ET	x EF	x ED	x IUR))	/ AT_c	= CR_{inh}
	Units:	mg/kg	µg/mg	m^3/kg	hours/day	days/year	years	$(\mu g/m^3)^{-1}$	hours	unitless
CAS No.	COC									
Industrial Worker (Surface Soil)										
7440-36-0	Antimony	(7.40E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-38-2	Arsenic	(6.7	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x 4.30E-03))	/ 6.13E+05	= 2E-07
7440-39-3	Barium	(1.42E+02	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-43-9	Cadmium	(2.80E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x 1.80E-03))	/ 6.13E+05	= 4E-09
7440-47-3	Chromium	(1.20E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x 1.20E-02))	/ 6.13E+05	= 1E-06
7439-98-7	Molydenum	(1.40E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-02-0	Nickel	(1.40E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x 2.60E-04))	/ 6.13E+05	= 3E-08
7782-49-2	Selenium	(9.20E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-28-0	Thallium	(1.70E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-61-1	Uranium	(6.00E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
7440-62-2	Vanadium	(2.10E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 2.50E+01	x ---))	/ 6.13E+05	= NA
									Total CR_{inh} =	1E-06
Construction Worker (Surface Soil)										
7440-36-0	Antimony	(7.40E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-38-2	Arsenic	(6.7	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x 4.30E-03))	/ 6.13E+05	= 9E-09
7440-39-3	Barium	(1.42E+02	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-43-9	Cadmium	(2.80E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x 1.80E-03))	/ 6.13E+05	= 2E-10
7440-47-3	Chromium	(1.20E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x 1.20E-02))	/ 6.13E+05	= 5E-08
7439-98-7	Molydenum	(1.40E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-02-0	Nickel	(1.40E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x 2.60E-04))	/ 6.13E+05	= 1E-09
7782-49-2	Selenium	(9.20E-01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-28-0	Thallium	(1.70E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-61-1	Uranium	(6.00E+00	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
7440-62-2	Vanadium	(2.10E+01	x 1.00E+03	x (1 / 1.00E+07)	x 8.00E+00	x 2.50E+02	x 1.00E+00	x ---))	/ 6.13E+05	= NA
									Total CR_{inh} =	6E-08

Table F-6-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

		Equation:	(	EPC	x	CF	x	(	1	/	PEF	)	x	ET	x	EF	x	ED	x	IUR	)	)	/	AT_c	=	CR_{inh}
		Units:		mg/kg		µg/mg					m^3/kg			hours/day		days/year		years		$(\mu g/m^3)^{-1}$				hours		unitless
CAS No.	**COC**																									
Construction Worker (Subsurface Soil)																										
7440-36-0	Antimony		(	7.00E-01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic		(	9.1	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	1E-08
7440-28-0	Thallium		(	1.70E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium		(	5.50E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	2.50E+02	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																								Total CR_{inh} =		1E-08
Utility Worker (Surface Soil)																										
7440-36-0	Antimony		(	7.40E-01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic		(	6.7	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	4E-10
7440-39-3	Barium		(	1.42E+02	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-43-9	Cadmium		(	2.80E-01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.80E-03	)	)	/	6.13E+05	=	7E-12
7440-47-3	Chromium		(	1.20E+01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	1.20E-02	)	)	/	6.13E+05	=	2E-09
7439-98-7	Molydenum		(	1.40E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-02-0	Nickel		(	1.40E+01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	2.60E-04	)	)	/	6.13E+05	=	5E-11
7782-49-2	Selenium		(	9.20E-01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-28-0	Thallium		(	1.70E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium		(	6.00E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-62-2	Vanadium		(	2.10E+01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																								Total CR_{inh} =		2E-09
Utility Worker (Subsurface Soil)																										
7440-36-0	Antimony		(	7.00E-01	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-38-2	Arsenic		(	9.1	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	4.30E-03	)	)	/	6.13E+05	=	5E-10
7440-28-0	Thallium		(	1.70E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
7440-61-1	Uranium		(	5.50E+00	x	1.00E+03	x	(	1	/	1.00E+07	)	x	8.00E+00	x	1.00E+01	x	1.00E+00	x	---	)	)	/	6.13E+05	=	NA
																								Total CR_{inh} =		5E-10

Table F-6-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	COC																	
Road Worker (Surface Soil)																		
7440-36-0	Antimony	(7.40E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(6.7	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	3E-09
7440-39-3	Barium	(1.42E+02	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.80E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.80E-03	)) /	6.13E+05	=	6E-11
7440-47-3	Chromium	(1.20E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	1.20E-02	)) /	6.13E+05	=	2E-08
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.40E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	2.60E-04	)) /	6.13E+05	=	4E-10
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.70E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(6.00E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.10E+01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	2E-08
Road Worker (Subsurface Soil)																		
7440-36-0	Antimony	(7.00E-01	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(9.1	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	4.30E-03	)) /	6.13E+05	=	5E-09
7440-28-0	Thallium	(1.70E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(5.50E+00	x	1.00E+03	x (1 /	1.00E+07	) x	8.00E+00	x	9.00E+01	x	1.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	5E-09

Table F-6-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

CAS No.	COC	(	EPC	x	CF	x	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:		mg/kg		μg/mg			m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
Maintenance Worker (Surface Soil)																				
7440-36-0	Antimony	(	7.40E-01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(	6.7	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	6E-09
7440-39-3	Barium	(	1.42E+02	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(	2.80E-01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.80E-03	)) /	6.13E+05	=	1E-10
7440-47-3	Chromium	(	1.20E+01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	1.20E-02	)) /	6.13E+05	=	3E-08
7439-98-7	Molydenum	(	1.40E+00	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(	1.40E+01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	2.60E-04	)) /	6.13E+05	=	8E-10
7782-49-2	Selenium	(	9.20E-01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(	1.70E+00	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(	6.00E+00	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(	2.10E+01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																		Total CR_{inh} =		4E-08
Maintenance Worker (Subsurface Soil)																				
7440-36-0	Antimony	(	7.00E-01	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(	9.1	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	4.30E-03	)) /	6.13E+05	=	9E-09
7440-28-0	Thallium	(	1.70E+00	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(	5.50E+00	x	1.00E+03	x	(1 /	1.00E+07	) x	8.00E+00	x	2.60E+01	x	6.60E+00	x	---	)) /	6.13E+05	=	NA
																		Total CR_{inh} =		9E-09

Table F-6-66. Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	x	ED	x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		$(\mu g/m^3)^{-1}$		hours		unitless
CAS No.	**COC**																	
Recreational User/Trespasser (Surface Soil)																		
7440-36-0	Antimony	(7.40E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	(6.7	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	4.30E-03	)) /	6.13E+05	=	2E-11
7440-39-3	Barium	(1.42E+02	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	(2.80E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.80E-03	)) /	6.13E+05	=	3E-13
7440-47-3	Chromium	(1.20E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	1.20E-02	)) /	6.13E+05	=	8E-11
7439-98-7	Molydenum	(1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	(1.40E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	2.60E-04	)) /	6.13E+05	=	2E-12
7782-49-2	Selenium	(9.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	(1.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	(6.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	(2.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	2.00E+00	x	2.60E+01	x	9.00E+00	x	---	)) /	6.13E+05	=	NA
																	Total CR_{inh} =	1E-10

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - CR calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-67. Age-Adjusted Calculations of Noncancer Hazard Quotients and Hazard Indices Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(	EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	RfC	)) /	AT_c	=	CR_{inh}
	Units:		mg/kg		μg/mg		m^3/kg		hours/day		days/year		years		years		mg/m^3		hours		unitless
CAS No.	**COC**																				
Resident (Surface Soil)																					
7440-36-0	Antimony	(	7.40E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	6.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	5E-11
7440-39-3	Barium	(	1.42E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	5.00E-04	)) /	2.28E+05	=	4E-08
7440-43-9	Cadmium	(	2.80E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-05	)) /	2.28E+05	=	2E-12
7440-47-3	Chromium	(	1.20E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.00E-04	)) /	2.28E+05	=	6E-10
7439-98-7	Molydenum	(	1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-02-0	Nickel	(	1.40E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	9.00E-05	)) /	2.28E+05	=	7E-10
7782-49-2	Selenium	(	9.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.00E-02	)) /	2.28E+05	=	1E-08
7440-28-0	Thallium	(	1.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	6.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	1E-10
7440-62-2	Vanadium	(	2.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
																			Total HI_{inh}	**=**	5E-08
Resident (Subsurface Soil)																					
7440-36-0	Antimony	(	7.00E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-38-2	Arsenic	(	9.10E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.50E-05	)) /	2.28E+05	=	7E-11
7440-28-0	Thallium	(	1.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	2.28E+05	=	NA
7440-61-1	Uranium	(	5.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.00E-05	)) /	2.28E+05	=	1E-10
																			Total HI_{inh}	**=**	2E-10

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{cr} - Exposure duration for child
ED_{ar} - Exposure duration for adult
AT_c - Carcinogenic averaging time
CR_{inh} - Cancer risk from inhalation
NA - HQ calculation is not applicable
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-68. Age-Adjusted Calculations of Cancer Risks Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

	Equation:	(EPC	x	CF	(1 /	PEF	) x	ET	x	EF	) x (	ED_{cr}	+	ED_{ar}	) x	IUR	)) /	AT_c	=	CR_{inh}
	Units:	mg/kg		µg/mg		m^3/kg		hours/day		days/year		years		years		$(µg/m^3)^{-1}$		hours		unitless
CAS No.	COC																			
Resident (Surface Soil)																				
7440-36-0	Antimony	7.40E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	6.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	6E-09
7440-39-3	Barium	1.42E+02	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-43-9	Cadmium	2.80E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.80E-03	)) /	6.13E+05	=	1E-10
7440-47-3	Chromium	MOA	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	1.20E-02	)) /	6.13E+05	=	NA
7439-98-7	Molydenum	1.40E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-02-0	Nickel	1.40E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	2.60E-04	)) /	6.13E+05	=	7E-10
7782-49-2	Selenium	9.20E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-28-0	Thallium	1.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	6.00E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-62-2	Vanadium	2.10E+01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	7E-09
Resident (Subsurface Soil)																				
7440-36-0	Antimony	7.00E-01	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-38-2	Arsenic	9.10E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	4.30E-03	)) /	6.13E+05	=	8E-09
7440-28-0	Thallium	1.70E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
7440-61-1	Uranium	5.50E+00	x	1.00E+03	x (1 /	1.36E+09	) x	1.84E+01	x	3.50E+02	) x (	6.00E+00	+	2.00E+01	) x	---	)) /	6.13E+05	=	NA
																			Total CR_{inh} =	8E-09

"---" - Value not available

CF - Conversion factor

ET - Exposure time

EF - Exposure frequency

ED_{cr} - Exposure duration for child

ED_{ar} - Exposure duration for adult

AT_c - Carcinogenic averaging time

CR_{inh} - Cancer risk from inhalation

NA - CR calculation is not applicable

Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

MOA - Chromium evaluated as hexavalent chromium, which is considered carcinogeninc via a mutagenic mode of action under the residential scenario. Therefore, age-adjusting that includes early life stages is performed in a separate calculation for the resident.

Table F-6-69. Age-Adjusted Calculations of Cancer Risks, via Mutagenic Mode of Action, Associated with Metal COC Concentrations in Soil: Inhalation of Dusts at IA-11

		Equation:	(EPC x CF) x (1 / PEF) x ET x EF x ((ED_{0-2} x $ADAF_{0-2}$) + (ED_{2-6} x $ADAF_{2-6}$) + (ED_{6-16} x $ADAF_{6-16}$) + (ED_{16-26} x $ADAF_{16-26}$)) x IUR) / AT_{c-inh} = MR_{inh}
		Units:	mg/kg µg/mg m^3/kg hours/day days/year years unitless years unitless years unitless years unitless $(\mu g/m^3)^{-1}$ hours unitless
CAS No.	COC	Is COC Mutagenic? (Yes/No)	
Resident (Surface Soil)			
7440-36-0	Antimony	No	(7.40E-01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-38-2	Arsenic	No	(6.70E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x 4.30E-03) / 6.13E+05 = NA
7440-39-3	Barium	No	(1.42E+02 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-43-9	Cadmium	No	(2.80E-01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x 1.80E-03) / 6.13E+05 = NA
7440-47-3	Chromium	**Yes**	(1.20E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x 1.20E-02) / 6.13E+05 = 8.0E-08
7439-98-7	Molydenum	No	(1.40E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-02-0	Nickel	No	(1.40E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x 2.60E-04) / 6.13E+05 = NA
7782-49-2	Selenium	No	(9.20E-01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-28-0	Thallium	No	(1.70E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-61-1	Uranium	No	(6.00E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-62-2	Vanadium	No	(2.10E+01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
			Total MR_{inh} = 8.0E-08
Resident (Subsurface Soil)			
7440-36-0	Antimony	No	(7.00E-01 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-38-2	Arsenic	No	(9.10E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x 4.30E-03) / 6.13E+05 = NA
7440-28-0	Thallium	No	(1.70E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
7440-61-1	Uranium	No	(5.50E+00 x 1.00E+03 x (1 / 1.36E+09) x 1.84E+01 x 3.50E+02 x ((2.00E+00 x 1.00E+01) + (4.00E+00 x 3.00E+00) + (1.00E+01 x 3.00E+00) + (1.00E+01 x 1.00E+00)) x ---) / 6.13E+05 = NA
			Total MR_{inh} = NA

"---" - Value not available
CF - Conversion factor
ET - Exposure time
EF - Exposure frequency
ED_{0-2} - Exposure duration for child resident, ages 0 to 2 years
ED_{2-6} - Exposure duration for child resident, ages 2 to 6 years
ED_{6-16} - Exposure duration for child resident, ages 6 to 16 years
ED_{16-26} - Exposure duration for adult resident, ages 16 to 26 years
$ADAF_{0-2}$ - Age-dependent adjustment factor for child resident, ages 0 to 2 years
$ADAF_{2-6}$ - Age-dependent adjustment factor for child resident, ages 2 to 6 years
$ADAF_{6-16}$ - Age-dependent adjustment factor for child resident, ages 6 to 16 years
$ADAF_{16-26}$ - Age-dependent adjustment factor for adult resident, ages 16 to 26 years
AT_c - Carcinogenic averaging time
MR_{inh} - Mutagenic cancer risk from inhalation
NA - CR not calculated because COC is not mutagenic and/or because of no available toxicity criterion
Not a COC - Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

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Table F-6-70. Surface Soil EPCs for Metal COCs at IA-11

CAS No.	COC	Surface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	0.74
7440-38-2	Arsenic	6.7
7440-39-3	Barium	142
7440-43-9	Cadmium	0.28
7440-47-3	Chromium	12
7439-98-7	Molydenum	1.4
7440-02-0	Nickel	14
7782-49-2	Selenium	0.92
7440-28-0	Thallium	1.7
7440-61-1	Uranium	6.0
7440-62-2	Vanadium	21

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority* (USACE 2013o).

[b] Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-71. Subsurface Soil EPCs for Metal COCs at IA-11

CAS No.	COC	Subsurface Soil EPC (mg/kg)[a,b]
7440-36-0	Antimony	0.7
7440-38-2	Arsenic	9.1
7440-28-0	Thallium	1.7
7440-61-1	Uranium	5.5

[a] EPCs obtained from the *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority* (USACE 2013o).

[b] Although arsenic was sampled at IA-13, the presence of arsenic was determined to be unrelated to past MED/AEC activities, per the *IA-13 Arsenic Position Paper, FUSRAP North St. Louis County Site* (USACE 2013r). Therefore, arsenic is not a COC at IA-13.

Table F-6-72. Toxicity Criteria Lookup Table[a]

CAS No.	COCs	Carcinogenic Effects (mg/kg-day)$^{-1}$			Noncarcinogenic Effects (mg/kg-day)[b]						GIABS (unitless)
					Subchronic Exposures			Chronic Exposures			
		Oral Slope Factor (mg/kg-day)$^{-1}$	Dermal Slope Factor[c] (mg/kg-day)$^{-1}$	IUR ($\mu g/m^3$)$^{-1}$	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	RfD_o (mg/kg-day)	RfD_d[c] (mg/kg-day)	Inhalation RfC (mg/m^3)	
7440-36-0	Antimony	---	---	---	4.00E-04	6.00E-05	---	4.00E-04	6.00E-05	---	1.50E-01
7440-38-2	Arsenic	1.50E+00	1.50E+00	4.30E-03	3.00E-04	3.00E-04	1.50E-05	3.00E-04	3.00E-04	1.50E-05	1.00E+00
7440-39-3	Barium	---	---	---	2.00E-01	1.40E-02	5.00E-03	2.00E-01	1.40E-02	5.00E-04	7.00E-02
7440-43-9	Cadmium	---	---	1.80E-03	5.00E-04	1.25E-05	---	1.00E-03	2.50E-05	1.00E-05	2.50E-02
7440-47-3	Chromium[d]	5.00E-01	2.00E+01	1.20E-02	---	---	---	3.00E-03	7.50E-05	1.00E-04	2.50E-02
7439-98-7	Molydenum	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	---	1.00E+00
7440-02-0	Nickel[e]	---	---	2.60E-04	2.00E-02	8.00E-04	2.00E-04	2.00E-02	8.00E-04	9.00E-05	4.00E-02
7782-49-2	Selenium	---	---	---	5.00E-03	5.00E-03	---	5.00E-03	5.00E-03	2.00E-02	1.00E+00
7440-28-0	Thallium[f]	---	---	---	5.00E-05	5.00E-05	---	2.00E-05	2.00E-05	---	1.00E+00
7440-61-1	Uranium	---	---	---	2.00E-04	2.00E-04	1.00E-04	3.00E-03	3.00E-03	4.00E-05	1.00E+00
7440-62-2	Vanadium[g]	---	---	---	5.04E-03	1.31E-04	---	5.04E-03	1.31E-04	---	2.60E-02

"---" Indicates no toxicity data are currently available

[a] All toxicity criteria were obtained from the online IRIS database (USEPA 2015b), the online RAIS database (ORNL 2015) (with other sources cited), or RSL Tables (USEPA 2015a).

[b] Subchronic RfDs and RfCs are applied to evaluations of the construction worker for consistency with the methodology used in the NC FS (USACE 2003a).

[c] Dermal SFs and RfDs are calculated from the corresponding oral SFs and RfDs and the GIABS values.

[d] Except fot the Inhalation UR, toxicity criteria for hexavalent chromium were used as surrogate values for chromium.

[e] Toxicity criteria for nickel as soluble salts are used for consistency with the NC FS. The inhalation toxicity criteria for nickel as nickel refinery dust are not used because nickel refinery dust is not applicable to MED/AEC contaminated soil at the NC Sites.

[f] Toxicity criteria for thallium sulfate is applied to the evaluation of thallium for consistency with the NC FS (USACE 2003a).

[g] The oral chronic RfD established for "vanadium and compounds" is used for the chronic and subchronic oral RfDs for vanadium, which were also used to calculate the corresponding dermal RfDs. The chronic oral RfD is a surrogate value calculated from the corresponding chronic oral RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion.

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APPENDIX G

CALCULATIONS FOR METALS EXPOSURE POINT CONCENTRATIONS NOT INCLUDED IN POST-REMEDIAL ACTION REPORTS

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ATTACHMENT G-1

EXPOSURE POINT CONCENTRATION CALCULATIONS FOR LATTY AVENUE PROPERTIES

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LIST OF TABLES

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Table G-1-1. HISS Subsurface Soil Metals Data

Station ID	Sample ID	Start Depth (ft)[a]	End Depth (ft)[a]	Easting	Northing	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
						Result	VQ	Result	VQ	Result	VQ
SVP138149	SVP138149	0	0.5	863270	1068798	1.4	UJ	9	=	3.3	U
SVP119246	SVP119246	0	0.5	863148	1068658	1.6	UJ	26	J	3.9	U
SVP110758	SVP110758	0	0.5	862979	1068781	1.3	J	7.7	=	0.72	U
SVP111845	SVP111845	0	0.5	863084	1068674	2.1	UJ	4.2	U	0.72	UJ
SVP119338	SVP119338	0	0.5	862897	1068379	1.6	UJ	10.8	J	3.8	U
SVP132534	SVP132534	0	0.5	863177	1068408	1.8	J	3.7	=	3.7	U
SVP134525	SVP134525	0	0.5	863061	1068358	1.8	J	9.2	=	3.8	U
SVP136730	SVP136730	0	0.5	863156	1068282	3.6	J	8	=	3.6	U
SVP137572	SVP137572	0	0.5	863142	1068005	1.5	U	20.1	=	3.6	U
SVP151256	SVP151258	0	0.5	1067897.4	863055.53	1.6	=	20	=	3.8	=
SVP109358	SVP109358	0	0.5	863088	1068140	3	=	7.1	=	1.7	U
SVP117916	SVP117916	0	0.5	863009	1068450	1.9	J	4.2	=	0.72	U
SVP131193	SVP131193	0	0.5	863220	1068633	19.6	J	3.8	=	5.4	J
					RG (mg/kg):	**25**		**40**		**30**	

[a] All depths are measured from the floor of a subsurface excavation.

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from the HISS.

All samples were collected from subsurface soil. No surface soil samples were collected.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-2. HISS Subsurface Soil Metals Data with Half Detection Limits

Station ID	Sample ID	Start Depth (ft)[a]	End Depth (ft)[a]	Easting	Northing	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
						Result	VQ	Result	VQ	Result	VQ
SVP138149	SVP138149	0	0.5	863270	1068798	0.7	UJ	9	=	1.65	U
SVP119246	SVP119246	0	0.5	863148	1068658	0.8	UJ	26	J	1.95	U
SVP110758	SVP110758	0	0.5	862979	1068781	1.3	J	7.7	=	0.36	U
SVP111845	SVP111845	0	0.5	863084	1068674	1.05	UJ	2.1	U	0.36	UJ
SVP119338	SVP119338	0	0.5	862897	1068379	0.8	UJ	10.8	J	1.9	U
SVP132534	SVP132534	0	0.5	863177	1068408	1.8	J	3.7	=	1.85	U
SVP134525	SVP134525	0	0.5	863061	1068358	1.8	J	9.2	=	1.9	U
SVP136730	SVP136730	0	0.5	863156	1068282	3.6	J	8	=	1.8	U
SVP137572	SVP137572	0	0.5	863142	1068005	0.75	U	20.1	=	1.8	U
SVP151256	SVP151258	0	0.5	1067897.4	863055.53	1.6	=	20	=	3.8	=
SVP109358	SVP109358	0	0.5	863088	1068140	3	=	7.1	=	0.85	U
SVP117916	SVP117916	0	0.5	863009	1068450	1.9	J	4.2	=	0.36	U
SVP131193	SVP131193	0	0.5	863220	1068633	19.6	J	3.8	=	5.4	J
					RG (mg/kg):	**25**		**40**		**30**	

[a] All depths are measured from the floor of a subsurface excavation.

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from the HISS.

All samples were collected from subsurface soil. No surface soil samples were collected.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-3. Parcel 10K530087 Surface Soil Metals Data

Station ID	Sample ID	Easting	Northing	Date	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Barium (mg/kg)		Cadmium (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Thallium (mg/kg)		Vanadium (mg/kg)	
							Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP96669	SVP96669	863003	1069351	10/3/2006	0	0.5	0.39	UJ	20.00	=	136.00	=	0.33	=	1.40	U	9.20	=	0.47	=	1.10	=	18.40	=
SVP96671	SVP96671	862827	1069412	10/3/2006	0	0.5	0.39	UJ	14.80	=	110.00	=	0.50	=	1.40	U	10.70	=	0.30	=	0.81	=	15.40	=
SVP96673	SVP96673	862968	1069534	10/3/2006	0	0.5	0.40	UJ	3.60	=	122.00	=	0.16	U	1.40	U	7.60	=	0.39	=	0.84	=	20.90	=
SVP96675	SVP96675	862827	1069534	10/3/2006	0	0.5	0.39	UJ	28.70	=	124.00	=	0.34	=	1.40	U	9.50	=	0.57	=	0.91	=	16.00	=
SVP99185	SVP99185	862913	1068956	2/14/2007	0	0.5	2.90	J	28.60	=	63.00	J	0.70	U	6.00	U	28.60	J	0.98	=	0.69	U	13.60	=
SVP99921	SVP99921	862801	1069099	3/26/2007	0	0.5	1.10	J	45.70	=	120.00	=	0.28	=	1.30	U	12.00	=	0.54	U	0.15	U	18.30	=
SVP102187	SVP102187	862842	1068965	4/20/2007	0	0.5	0.42	UJ	6.10	=	242.00	=	0.32	=	1.50	U	20.50	J	0.22	U	0.79	=	25.90	=
SVP102645	SVP102645	862960	1069208	5/7/2007	0	0.5	0.41	UJ	5.10	=	167.00	J	0.17	U	1.40	U	12.60	=	0.49	J	0.40	J	22.20	J
SVP103154	SVP103154	862804	1069278	5/17/2007	0	0.5	0.40	UJ	4.70	=	154.00	=	0.24	=	1.40	U	13.50	=	0.21	U	0.65	=	19.80	=
SVP103877	SVP103877	862768	1068961	5/25/2007	0	0.5	2.00	UJ	9.70	=	129.00	J	0.81	U	1.40	U	17.90	=	1.80	=	8.10	UJ	27.80	=
						RG (mg/kg):	**15**		**36**		**2,800**		**12**		**1,000**		**1,500**		**300**		**25**		**112**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from Parcel 10K530087.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-4. Parcel 10K530087 Surface Soil Metals Data with Half Detection Limits

Station ID	Sample ID	Easting	Northing	Date	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Barium (mg/kg)		Cadmium (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Thallium (mg/kg)		Vanadium (mg/kg)	
							Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP96669	SVP96669	863003	1069351	10/3/2006	0	0.5	0.195	UJ	20.00	=	136.00	=	0.33	=	0.70	U	9.20	=	0.47	=	1.10	=	18.40	=
SVP96671	SVP96671	862827	1069412	10/3/2006	0	0.5	0.20	UJ	14.80	=	110.00	=	0.50	=	0.70	U	10.70	=	0.30	=	0.81	=	15.40	=
SVP96673	SVP96673	862968	1069534	10/3/2006	0	0.5	0.20	UJ	3.60	=	122.00	=	0.08	U	0.70	U	7.60	=	0.39	=	0.84	=	20.90	=
SVP96675	SVP96675	862827	1069534	10/3/2006	0	0.5	0.20	UJ	28.70	=	124.00	=	0.34	=	0.70	U	9.50	=	0.57	=	0.91	=	16.00	=
SVP99185	SVP99185	862913	1068956	2/14/2007	0	0.5	2.90	J	28.60	=	63.00	J	0.35	U	3.00	U	28.60	J	0.98	=	0.35	U	13.60	=
SVP99921	SVP99921	862801	1069099	3/26/2007	0	0.5	1.10	J	45.70	=	120.00	=	0.28	=	0.65	U	12.00	=	0.27	U	0.08	U	18.30	=
SVP102187	SVP102187	862842	1068965	4/20/2007	0	0.5	0.21	UJ	6.10	=	242.00	=	0.32	=	0.75	U	20.50	J	0.11	U	0.79	=	25.90	=
SVP102645	SVP102645	862960	1069208	5/7/2007	0	0.5	0.21	UJ	5.10	=	167.00	J	0.09	U	0.70	U	12.60	=	0.49	J	0.40	J	22.20	J
SVP103154	SVP103154	862804	1069278	5/17/2007	0	0.5	0.20	UJ	4.70	=	154.00	=	0.24	=	0.70	U	13.50	=	0.11	U	0.65	=	19.80	=
SVP103877	SVP103877	862768	1068961	5/25/2007	0	0.5	1.00	UJ	9.70	=	129.00	J	0.41	U	0.70	U	17.90	=	1.80	=	4.05	UJ	27.80	=
						RG (mg/kg):	**15**		**36**		**2,800**		**12**		**1,000**		**1,500**		**300**		**25**		**112**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from Parcel 10K530087.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-5. Parcel 10K530087 Subsurface Soil Metals Data

Station ID	Sample ID	Easting	Northing	Date	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
							Result	VQ	Result	VQ	Result	VQ
SVP96665	SVP96666	862791	1069107	10/3/2006	2	2.5	0.41	UJ	6.70	=	1.70	=
SVP96667	SVP96668	862933	1068985	10/3/2006	2	2.5	0.42	UJ	7.60	=	1.50	=
SVP96669	SVP96670	863003	1069351	10/3/2006	2	2.5	0.41	UJ	9.60	=	2.40	=
SVP96671	SVP96672	862827	1069412	10/3/2006	2	2.5	0.41	UJ	11.10	=	1.80	=
SVP96673	SVP96674	862968	1069534	10/3/2006	2	2.5	0.43	UJ	15.40	=	2.70	=
SVP96675	SVP96676	862827	1069534	10/3/2006	2	2.5	0.42	UJ	11.50	=	2.50	=
SVP96663	SVP96664	862897	1069290	10/3/2006	2	2.5	2.10	UJ	11.60	=	2.50	=
SVP101135	SVP101156	862932	1069102	3/27/2007	0.5	1	0.43	J	7.20	=	0.17	U
						RG (mg/kg):	**25**		**40**		**30**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from Parcel 10K530087.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-6. Parcel 10K530087 Subsurface Soil Metals Data with Half Detection Limits

Station ID	Sample ID	Easting	Northing	Date	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
							Result	VQ	Result	VQ	Result	VQ
SVP96665	SVP96666	862791	1069107	10/3/2006	2	2.5	0.205	UJ	6.70	=	1.70	=
SVP96667	SVP96668	862933	1068985	10/3/2006	2	2.5	0.21	UJ	7.60	=	1.50	=
SVP96669	SVP96670	863003	1069351	10/3/2006	2	2.5	0.21	UJ	9.60	=	2.40	=
SVP96671	SVP96672	862827	1069412	10/3/2006	2	2.5	0.21	UJ	11.10	=	1.80	=
SVP96673	SVP96674	862968	1069534	10/3/2006	2	2.5	0.22	UJ	15.40	=	2.70	=
SVP96675	SVP96676	862827	1069534	10/3/2006	2	2.5	0.21	UJ	11.50	=	2.50	=
SVP96663	SVP96664	862897	1069290	10/3/2006	2	2.5	1.05	UJ	11.60	=	2.50	=
SVP101135	SVP101156	862932	1069102	3/27/2007	0.5	1	0.43	J	7.20	=	0.09	U
						RG (mg/kg):	**25**		**40**		**30**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from Parcel 10K530087.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-7. VP-02(L) Surface Soil Metals Data

Station Name	Sample Name	Easting	Northing	Collect Date	Criteria	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Barium (mg/kg)		Cadmium (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)		Vanadium (mg/kg)	
								Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP123768	SVP123768	863321	1068754	4/14/2010	Surface	0.0	0.5	1.5	UJ	3.7	=	134	=	0.13	=	0.74	U	10.6	=	0.68	U	3.5	U	12.3	U	20.3	=
SVP123826	SVP123826	863778	1068694	4/16/2010	Surface	0.0	0.5	1.5	UJ	5.4	=	180	J	0.12	U	1	=	19.2	=	0.7	U	3.6	U	12.6	U	31.5	=
SVP123890	SVP123890	863286	1068514	4/13/2010	Surface	0.0	0.5	0.82	UJ	4.6	=	156	J	0.64	U	0.62	=	16.7	=	3.7	U	19.3	U	6.7	U	24.8	=
SVP123912	SVP123912	863744	1068448	1/27/2010	Surface	0.0	0.5	0.93	J	5.4	=	125	=	0.77	=	0.86	=	17.1	=	2.3	=	9.5	UJ	8.8	=	26.7	=
SVP123954	SVP123954	863639	1068082	3/31/2010	Surface	0.0	0.5	1	J	2.9	=	101	J	0.6	=	1.1	=	12.3	=	4.2	=	1.9	U	6.7	U	15.1	=
SVP123996	SVP123996	863604	1067902	4/7/2010	Surface	0.0	0.5	0.86	UJ	4.2	=	136	J	0.3	=	0.58	=	9	=	0.39	U	2	U	7.1	U	19.8	=
SVP128976	SVP128976	863402	1068387	8/9/2010	Surface	0.0	0.5	47.3	=	12.6	=	7.5	J	3.4	J	10.1	UJ	10.1	J	2.9	U	15.3	U	13.4	U	14.2	J
RG (mg/kg):								**15**		**36**		**2,800**		**12**		**1,000**		**1,500**		**300**		**25**		**150**		**112**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from VP-02(L).

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-8. VP-02(L) Surface Soil Metals Data with Half Detection Limits

Station Name	Sample Name	Easting	Northing	Collect Date	Criteria	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Barium (mg/kg)		Cadmium (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)		Vanadium (mg/kg)	
								Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP123768	SVP123768	863321	1068754	4/14/2010	Surface	0.0	0.5	0.75	UJ	3.7	=	134	=	0.13	=	0.37	U	10.6	=	0.34	U	1.75	U	6.15	U	20.3	=
SVP123826	SVP123826	863778	1068694	4/16/2010	Surface	0.0	0.5	0.75	UJ	5.4	=	180	J	0.06	U	1	=	19.2	=	0.35	U	1.8	U	6.3	U	31.5	=
SVP123890	SVP123890	863286	1068514	4/13/2010	Surface	0.0	0.5	0.41	UJ	4.6	=	156	J	0.32	U	0.62	=	16.7	=	1.85	U	9.65	U	3.35	U	24.8	=
SVP123912	SVP123912	863744	1068448	1/27/2010	Surface	0.0	0.5	0.93	J	5.4	=	125	=	0.77	=	0.86	=	17.1	=	2.3	=	4.75	UJ	8.8	=	26.7	=
SVP123954	SVP123954	863639	1068082	3/31/2010	Surface	0.0	0.5	1	J	2.9	=	101	J	0.6	=	1.1	=	12.3	=	4.2	=	0.95	U	3.35	U	15.1	=
SVP123996	SVP123996	863604	1067902	4/7/2010	Surface	0.0	0.5	0.43	UJ	4.2	=	136	J	0.3	=	0.58	=	9	=	0.195	U	1	U	3.55	U	19.8	=
SVP128976	SVP128976	863402	1068387	8/9/2010	Surface	0.0	0.5	47.3	=	12.6	=	7.5	J	3.4	J	5.05	UJ	10.1	J	1.45	U	7.65	U	6.7	U	14.2	J
RG (mg/kg):								**15**		**36**		**2,800**		**12**		**1,000**		**1,500**		**300**		**25**		**150**		**112**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from VP-02(L).

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-9. VP-02(L) Subsurface Soil Metals Data

Station Name	Sample Name	Easting	Northing	Collect Date	Criteria	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)	
								Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP02360	SVP02360	863311	1068298	10/3/2000	Subsurface*	0.0	0.5	0.42	=	12.9	=	1.3	U	4.2	U
SVP02370	SVP02370	863359	1068262	10/3/2000	Subsurface*	0.0	0.5	0.74	=	13.6	=	0.99	U	4.4	U
SVP123469	SVP123469	863811	1068688	12/22/2009	Subsurface*	0.0	0.5	0.88	=	3.3	=	8.9	U	7.5	=
SVP123475	SVP123475	863767	1068499	12/22/2009	Subsurface*	0.0	0.5	0.99	J	4.3	=	1.8	U	6.3	=
SVP124371	SVP124371	863471	1068715	1/21/2010	Subsurface*	0.0	0.5	1.2	J	5.8	=	2	U	6.8	U
SVP124518	SVP124518	863345	1068455	2/2/2010	Subsurface*	0.0	0.5	1.6	UJ	13.7	=	9.4	U	13.1	U
SVP124602	SVP124602	863745	1068624	2/3/2010	Subsurface*	0.0	0.5	1.5	J	12.4	=	9.4	U	6.5	=
SVP126227	SVP126227	863599	1067987	3/3/2010	Subsurface*	0.0	0.5	0.79	UJ	3.1	=	1.9	U	6.5	U
SVP126528	SVP126528	863223	1068000	3/16/2010	Subsurface*	0.0	0.5	1.2	J	11.4	=	18.7	U	11.6	J
SVP127229	SVP127229	863252	1068408	4/27/2010	Subsurface*	0.0	0.5	0.8	UJ	6.4	=	18.9	U	9.2	=
SVP127649	SVP127649	863238	1068178	5/11/2010	Subsurface*	0.0	0.5	0.76	UJ	3.8	U	18	U	6.6	=
SVP127722	SVP127722	863311	1068204	5/24/2010	Subsurface*	0.0	0.5	0.88	J	7.2	=	17	U	9.8	=
SVP128625	SVP128625	863267	1068076	6/24/2010	Subsurface*	0.0	0.5	0.74	UJ	8.3	=	17.3	U	7.3	=
SVP131733	SVP131733	863267	1068637	10/20/2010	Subsurface*	0.0	0.5	2.4	J	2.7	=	3.9	U	53.1	UJ
SVP87215	SVP87215	863409	1068607	5/18/2005	Subsurface*	0.0	0.5	0.39	U	1.9	=	3.1	=	67.5	UJ
SVP129004	SVP129006	863396	1068295	8/10/2010	Subsurface	3.0	3.5	76.6	=	18.3	=	19.4	U	16.7	U
							RG (mg/kg):	**25**		**40**		**30**		**150**	

* Sample depths were 0 to 0.5 ft from the surface of the excavation floor; therefore, the samples are evaluated as subsurface soil.

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, thallium and uranium are the only applicable non-radiological COCs for subsurface soil samples collected from VP-02(L).

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-1-10. VP-02(L) Subsurface Soil Metals Data with Half Detection Limits

Station Name	Sample Name	Easting	Northing	Collect Date	Criteria	Start Depth (ft)	End Depth (ft)	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)	
								Result	VQ	Result	VQ	Result	VQ	Result	VQ
SVP02360	SVP02360	863311	1068298	10/3/2000	Subsurface*	0.0	0.5	0.42	=	12.9	=	0.65	U	2.1	U
SVP02370	SVP02370	863359	1068262	10/3/2000	Subsurface*	0.0	0.5	0.74	=	13.6	=	0.495	U	2.2	U
SVP123469	SVP123469	863811	1068688	12/22/2009	Subsurface*	0.0	0.5	0.88	=	3.3	=	4.45	U	7.5	=
SVP123475	SVP123475	863767	1068499	12/22/2009	Subsurface*	0.0	0.5	0.99	J	4.3	=	0.9	U	6.3	=
SVP124371	SVP124371	863471	1068715	1/21/2010	Subsurface*	0.0	0.5	1.2	J	5.8	=	1	U	3.4	U
SVP124518	SVP124518	863345	1068455	2/2/2010	Subsurface*	0.0	0.5	0.8	UJ	13.7	=	4.7	U	6.55	U
SVP124602	SVP124602	863745	1068624	2/3/2010	Subsurface*	0.0	0.5	1.5	J	12.4	=	4.7	U	6.5	=
SVP126227	SVP126227	863599	1067987	3/3/2010	Subsurface*	0.0	0.5	0.395	UJ	3.1	=	0.95	U	3.25	U
SVP126528	SVP126528	863223	1068000	3/16/2010	Subsurface*	0.0	0.5	1.2	J	11.4	=	9.35	U	11.6	J
SVP127229	SVP127229	863252	1068408	4/27/2010	Subsurface*	0.0	0.5	0.4	UJ	6.4	=	9.45	U	9.2	=
SVP127649	SVP127649	863238	1068178	5/11/2010	Subsurface*	0.0	0.5	0.38	UJ	1.9	U	9	U	6.6	=
SVP127722	SVP127722	863311	1068204	5/24/2010	Subsurface*	0.0	0.5	0.88	J	7.2	=	8.5	U	9.8	=
SVP128625	SVP128625	863267	1068076	6/24/2010	Subsurface*	0.0	0.5	0.37	UJ	8.3	=	8.65	U	7.3	=
SVP131733	SVP131733	863267	1068637	10/20/2010	Subsurface*	0.0	0.5	2.4	J	2.7	=	1.95	U	26.55	UJ
SVP87215	SVP87215	863409	1068607	5/18/2005	Subsurface*	0.0	0.5	0.195	U	1.9	=	3.1	=	33.75	UJ
SVP129004	SVP129006	863396	1068295	8/10/2010	Subsurface	3.0	3.5	76.6	=	18.3	=	9.7	U	8.35	U
							RG (mg/kg):	**25**		**40**		**30**		**150**	

* Sample depths were 0 to 0.5 ft from the surface of the excavation floor; therefore, the samples are evaluated as subsurface soil.

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, thallium and uranium are the only applicable non-radiological COCs for subsurface soil samples collected from VP-02(L).

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-1-11. Futura Subsurface Soil Metals Data

Station Name	Sample Name	Easting	Northing	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
				Result	VQ	Result	VQ	Result	VQ
SVP92458	SVP91482	862945	1067954	0.4	U	13.5	=	2.9	=
SVP91550	SVP91567	862746	1068205	0.4	U	8.9	=	2.3	=
SVP108964	SVP108964	862939	1068137	2.5	=	7.0	=	0.8	U
SVP108982	SVP108982	862909	1067929	2.4	=	2.1	=	0.8	U
SVP109336	SVP109336	863017	1068061	2.5	=	4.6	=	1.7	U
SVP110580	SVP110580	863002	1067934	2.9	=	3.9	=	0.7	U
SVP111494	SVP111494	862726	1068366	2.7	J	6.6	=	0.7	U
SVP114233	SVP114233	862787	1068813	5.5	J	12.1	=	1.8	U
SVP116602	SVP116602	862737	1068267	2.6	J	8.0	=	1.8	U
SVP125643	SVP125643	862897	1068655	1.2	J	6.5	=	21.2	U
SVP129747	SVP129747	862755	1068575	10.7	J	13.3	=	3.7	U
			RG (mg/kg):	**25**		**40**		**30**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from the Futura property.

All samples were collected from subsurface soil. No surface soil samples were collected.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-12. Futura Subsurface Soil Metals Data with Half Detection Limits

Station Name	Sample Name	Easting	Northing	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)	
				Result	VQ	Result	VQ	Result	VQ
SVP92458	SVP91482	862945	1067954	0.2	U	13.5	=	2.9	=
SVP91550	SVP91567	862746	1068205	0.2	U	8.9	=	2.3	=
SVP108964	SVP108964	862939	1068137	2.5	=	7.0	=	0.4	U
SVP108982	SVP108982	862909	1067929	2.4	=	2.1	=	0.4	U
SVP109336	SVP109336	863017	1068061	2.5	=	4.6	=	0.9	U
SVP110580	SVP110580	863002	1067934	2.9	=	3.9	=	0.4	U
SVP111494	SVP111494	862726	1068366	2.7	J	6.6	=	0.4	U
SVP114233	SVP114233	862787	1068813	5.5	J	12.1	=	0.9	U
SVP116602	SVP116602	862737	1068267	2.6	J	8.0	=	0.9	U
SVP125643	SVP125643	862897	1068655	1.2	J	6.5	=	10.6	U
SVP129747	SVP129747	862755	1068575	10.7	J	13.3	=	1.9	U
			RG (mg/kg):	**25**		**40**		**30**	

Notes:

Per the NC ROD (USACE 2005a), antimony, arsenic, and thallium are the only applicable non-radiological COCs for subsurface soil samples collected from the Futura property.

All samples were collected from subsurface soil. No surface soil samples were collected.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

Table G-1-13. Latty Avenue Subsurface Soil Metals Data with Half Detection Limits

Property	Antimony (mg/kg)		Arsenic (mg/kg)		Barium (mg/kg)		Cadmium (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)		Vanadium (mg/kg)	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Parcel 10K530087	0.195	UJ	20	=	136	=	0.33	=	0.7	U	9.2	=	0.47	=	1.1	=	NA	NA	18.4	=
	0.195	UJ	14.8	=	110	=	0.5	=	0.7	U	10.7	=	0.3	=	0.81	=	NA	NA	15.4	=
	0.2	UJ	3.6	=	122	=	0.08	U	0.7	U	7.6	=	0.39	=	0.84	=	NA	NA	20.9	=
	0.195	UJ	28.7	=	124	=	0.34	=	0.7	U	9.5	=	0.57	=	0.91	=	NA	NA	16	=
	2.9	J	28.6	=	63	J	0.35	U	3	U	28.6	J	0.98	=	0.345	U	NA	NA	13.6	=
	1.1	J	45.7	=	120	=	0.28	=	0.65	U	12	=	0.27	U	0.075	U	NA	NA	18.3	=
	0.21	UJ	6.1	=	242	=	0.32	=	0.75	U	20.5	J	0.11	U	0.79	=	NA	NA	25.9	=
	0.205	UJ	5.1	=	167	J	0.085	U	0.7	U	12.6	=	0.49	J	0.4	J	NA	NA	22.2	J
	0.2	UJ	4.7	=	154	=	0.24	=	0.7	U	13.5	=	0.105	U	0.65	=	NA	NA	19.8	=
	1	UJ	9.7	=	129	J	0.405	U	0.7	U	17.9	=	1.8	=	4.05	UJ	NA	NA	27.8	=
VP-02(L)	0.75	UJ	3.7	=	134	=	0.13	=	0.37	U	10.6	=	0.34	U	1.75	U	6.15	U	20.3	=
	0.75	UJ	5.4	=	180	J	0.06	U	1	=	19.2	=	0.35	U	1.8	U	6.3	U	31.5	=
	0.41	UJ	4.6	=	156	J	0.32	U	0.62	=	16.7	=	1.85	U	9.65	U	3.35	U	24.8	=
	0.93	J	5.4	=	125	=	0.77	=	0.86	=	17.1	=	2.3	=	4.75	UJ	8.8	=	26.7	=
	1	J	2.9	=	101	J	0.6	=	1.1	=	12.3	=	4.2	=	0.95	U	3.35	U	15.1	=
	0.43	UJ	4.2	=	136	J	0.3	=	0.58	=	9	=	0.195	U	1	U	3.55	U	19.8	=
	47.3	=	12.6	=	7.5	J	3.4	J	5.05	UJ	10.1	J	1.45	U	7.65	U	6.7	U	14.2	J

Notes:

Of the four evaluated Latty Avenue Properties, surface soil samples were collected from only Parcel 10K530087 and VP-02(L). Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from VP-02(L). The same surface soil COCs apply to Parcel 10K530087, except for uranium.

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

NA - Uranium was not analyzed in surface soil samples collected from Parcel 10K530087, because it is not a COC for that property.

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Table G-1-14. Latty Avenue Subsurface Soil Metals Data with Half Detection Limits

Property	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ
HISS	0.7	UJ	9	=	1.65	U	NA	NA
	0.8	UJ	26	J	1.95	U	NA	NA
	1.3	J	7.7	=	0.36	U	NA	NA
	1.05	UJ	2.1	U	0.36	UJ	NA	NA
	0.8	UJ	10.8	J	1.9	U	NA	NA
	1.8	J	3.7	=	1.85	U	NA	NA
	1.8	J	9.2	=	1.9	U	NA	NA
	3.6	J	8	=	1.8	U	NA	NA
	0.75	U	20.1	=	1.8	U	NA	NA
	1.6	=	20	=	3.8	=	NA	NA
	3	=	7.1	=	0.85	U	NA	NA
	1.9	J	4.2	=	0.36	U	NA	NA
	19.6	J	3.8	=	5.4	J	NA	NA
Parcel 10K530087	0.205	UJ	6.7	=	1.7	=	NA	NA
	0.21	UJ	7.6	=	1.5	=	NA	NA
	0.205	UJ	9.6	=	2.4	=	NA	NA
	0.205	UJ	11.1	=	1.8	=	NA	NA
	0.215	UJ	15.4	=	2.7	=	NA	NA
	0.21	UJ	11.5	=	2.5	=	NA	NA
	1.05	UJ	11.6	=	2.5	=	NA	NA
	0.43	J	7.2	=	0.085	U	NA	NA
VP-02(L)	0.42	=	12.9	=	0.65	U	2.1	U
	0.74	=	13.6	=	0.495	U	2.2	U
	0.88	=	3.3	=	4.45	U	7.5	=
	0.99	J	4.3	=	0.9	U	6.3	=
	1.2	J	5.8	=	1	U	3.4	U
	0.8	UJ	13.7	=	4.7	U	6.55	U
	1.5	J	12.4	=	4.7	U	6.5	=
	0.395	UJ	3.1	=	0.95	U	3.25	U
	1.2	J	11.4	=	9.35	U	11.6	J
	0.4	UJ	6.4	=	9.45	U	9.2	=
	0.38	UJ	1.9	U	9	U	6.6	=
	0.88	J	7.2	=	8.5	U	9.8	=
	0.37	UJ	8.3	=	8.65	U	7.3	=
	2.4	J	2.7	=	1.95	U	26.55	UJ
	0.195	U	1.9	=	3.1	=	33.75	UJ
	76.6	=	18.3	=	9.7	U	8.35	U

Table G-1-14. Latty Avenue Subsurface Soil Metals Data with Half Detection Limits

Property	Antimony (mg/kg)		Arsenic (mg/kg)		Thallium (mg/kg)		Uranium (mg/kg)	
	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Futura	0.205	U	13.5	=	2.9	=	NA	NA
	0.215	U	8.9	=	2.3	=	NA	NA
	2.5	=	7	=	0.38	U	NA	NA
	2.4	=	2.1	=	0.385	U	NA	NA
	2.5	=	4.6	=	0.85	U	NA	NA
	2.9	=	3.9	=	0.36	U	NA	NA
	2.7	J	6.6	=	0.37	U	NA	NA
	5.5	J	12.1	=	0.9	U	NA	NA
	2.6	J	8	=	0.9	U	NA	NA
	1.2	J	6.5	=	10.6	U	NA	NA
	10.7	J	13.3	=	1.85	U	NA	NA

Notes:

Subsurface soil samples were collected from all four Latty Avenue Properties evaluated in the this five-year review (HISS, Parcel 10K530087, VP-02(L), and Futura). Per the NC ROD (USACE 2005a), antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are the applicable non-radiological COCs for surface soil samples collected from VP-02(L). The same surface soil COCs apply to Parcel 10K530087, except for uranium.

Validation qualifier (VQ) definitions are as follows: "=" for positive results, "U" for not detected above this value, "J" for estimated quantity, and "UJ" for not detected above estimated value.

NA - Uranium was not analyzed in subsurface soil samples collected from the HISS, Parcel 10K530087, and Futura, because it is not a COC at those properties.

Table G-1-15. ProUCL Input for Combined Latty Avenue Surface Soil Metals Data

Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)
0.195	20	136	0.33	0.7	9.2	0.47	1.1	6.15	18.4
0.195	14.8	110	0.5	0.7	10.7	0.3	0.81	6.3	15.4
0.2	3.6	122	0.08	0.7	7.6	0.39	0.84	3.35	20.9
0.195	28.7	124	0.34	0.7	9.5	0.57	0.91	8.8	16
2.9	28.6	63	0.35	3	28.6	0.98	0.345	3.35	13.6
1.1	45.7	120	0.28	0.65	12	0.27	0.075	3.55	18.3
0.21	6.1	242	0.32	0.75	20.5	0.11	0.79	6.7	25.9
0.205	5.1	167	0.085	0.7	12.6	0.49	0.4	---	22.2
0.2	4.7	154	0.24	0.7	13.5	0.105	0.65	---	19.8
1	9.7	129	0.405	0.7	17.9	1.8	4.05	---	27.8
0.75	3.7	134	0.13	0.37	10.6	0.34	1.75	---	20.3
0.75	5.4	180	0.06	1	19.2	0.35	1.8	---	31.5
0.41	4.6	156	0.32	0.62	16.7	1.85	9.65	---	24.8
0.93	5.4	125	0.77	0.86	17.1	2.3	4.75	---	26.7
1	2.9	101	0.6	1.1	12.3	4.2	0.95	---	15.1
0.43	4.2	136	0.3	0.58	9	0.195	1	---	19.8
47.3	12.6	7.5	3.4	5.05	10.1	1.45	7.65	---	14.2

"---" Data not available

Table G-1-16. ProUCL Input for Combined Latty Avenue Subsurface Soil Metals Data

Antimony (mg/kg)	Arsenic (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)
0.7	9	1.65	2.1
0.8	26	1.95	2.2
1.3	7.7	0.36	7.5
1.05	2.1	0.36	6.3
0.8	10.8	1.9	3.4
1.8	3.7	1.85	6.55
1.8	9.2	1.9	6.5
3.6	8	1.8	3.25
0.75	20.1	1.8	11.6
1.6	20	3.8	9.2
3	7.1	0.85	6.6
1.9	4.2	0.36	9.8
19.6	3.8	5.4	7.3
0.205	6.7	1.7	26.55
0.21	7.6	1.5	33.75
0.205	9.6	2.4	8.35
0.205	11.1	1.8	---
0.215	15.4	2.7	---
0.21	11.5	2.5	---
1.05	11.6	2.5	---
0.43	7.2	0.085	---
0.42	12.9	0.65	---
0.74	13.6	0.495	---
0.88	3.3	4.45	---
0.99	4.3	0.9	---
1.2	5.8	1	---
0.8	13.7	4.7	---
1.5	12.4	4.7	---
0.395	3.1	0.95	---
1.2	11.4	9.35	---
0.4	6.4	9.45	---
0.38	1.9	9	---
0.88	7.2	8.5	---
0.37	8.3	8.65	---
2.4	2.7	1.95	---
0.195	1.9	3.1	---
76.6	18.3	9.7	---
0.205	13.5	2.9	---
0.215	8.9	2.3	---
2.5	7	0.38	---
2.4	2.1	0.385	---
2.5	4.6	0.85	---
2.9	3.9	0.36	---
2.7	6.6	0.37	---
5.5	12.1	0.9	---
2.6	8	0.9	---
1.2	6.5	10.6	---
10.7	13.3	1.85	---

"---" Data not available

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

User Selected Options	
Date/Time of Computation	10/13/2014 8:29:51 AM
From File	Latty SS ProUCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Antimony (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	0.195	Mean	3.41
Maximum	47.3	Median	0.43
SD	11.33	Std. Error of Mean	2.748
Coefficient of Variation	3.323	Skewness	4.099

Normal GOF Test

Shapiro Wilk Test Statistic	0.303	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.463	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	8.208	5% Adjusted-CLT UCL (Chen-1995)	10.85
		l5% Modified-t UCL (Johnson-1978)	8.663

Gamma GOF Test

A-D Test Statistic	3.14	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.824	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.393	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.224	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.382	k star (bias corrected MLE)	0.354
Theta hat (MLE)	8.923	Theta star (bias corrected MLE)	9.635
nu hat (MLE)	12.99	nu star (bias corrected)	12.03
MLE Mean (bias corrected)	3.41	MLE Sd (bias corrected)	5.732
		pproximate Chi Square Value (0.05)	5.249
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	4.787

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	7.817	ısted Gamma UCL (use when n<50)	8.573

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.763	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.892	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.215	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.635	Mean of logged Data	-0.508
Maximum of Logged Data	3.857	SD of logged Data	1.402

Assuming Lognormal Distribution

95% H-UCL	5.14	90% Chebyshev (MVUE) UCL	3.17
95% Chebyshev (MVUE) UCL	3.947	97.5% Chebyshev (MVUE) UCL	5.025
99% Chebyshev (MVUE) UCL	7.144		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	7.93	95% Jackknife UCL	8.208
95% Standard Bootstrap UCL	7.732	95% Bootstrap-t UCL	98.36
95% Hall's Bootstrap UCL	40.47	95% Percentile Bootstrap UCL	8.842
95% BCA Bootstrap UCL	11.73		
90% Chebyshev(Mean, Sd) UCL	11.65	95% Chebyshev(Mean, Sd) UCL	15.39
97.5% Chebyshev(Mean, Sd) UCL	20.57	99% Chebyshev(Mean, Sd) UCL	30.75

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	15.39

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Arsenic (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	2.9	Mean	12.11
Maximum	45.7	Median	5.4
SD	12.06	Std. Error of Mean	2.926
Coefficient of Variation	0.996	Skewness	1.735

Normal GOF Test

Shapiro Wilk Test Statistic	0.748	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	17.21	5% Adjusted-CLT UCL (Chen-1995)	18.23
		l5% Modified-t UCL (Johnson-1978)	17.42

Gamma GOF Test

A-D Test Statistic	1.08	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.265	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.213	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.474	k star (bias corrected MLE)	1.253
Theta hat (MLE)	8.21	Theta star (bias corrected MLE)	9.658
nu hat (MLE)	50.13	nu star (bias corrected)	42.62
MLE Mean (bias corrected)	12.11	MLE Sd (bias corrected)	10.81
		pproximate Chi Square Value (0.05)	28.65
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	27.45

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	18.01	ısted Gamma UCL (use when n<50)	18.79

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.23	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.065	Mean of logged Data	2.118
Maximum of Logged Data	3.822	SD of logged Data	0.851

Assuming Lognormal Distribution

95% H-UCL	20.02	90% Chebyshev (MVUE) UCL	19.39
95% Chebyshev (MVUE) UCL	22.92	97.5% Chebyshev (MVUE) UCL	27.81
99% Chebyshev (MVUE) UCL	37.42		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	16.92	95% Jackknife UCL	17.21
95% Standard Bootstrap UCL	16.72	95% Bootstrap-t UCL	19.67
95% Hall's Bootstrap UCL	18.29	95% Percentile Bootstrap UCL	16.96
95% BCA Bootstrap UCL	18.15		
90% Chebyshev(Mean, Sd) UCL	20.88	95% Chebyshev(Mean, Sd) UCL	24.86
97.5% Chebyshev(Mean, Sd) UCL	30.38	99% Chebyshev(Mean, Sd) UCL	41.22

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 24.86

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Barium (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	7.5	Mean	129.8
Maximum	242	Median	129
SD	49.19	Std. Error of Mean	11.93
Coefficient of Variation	0.379	Skewness	-0.32

Normal GOF Test

Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	150.6	5% Adjusted-CLT UCL (Chen-1995)	148.4
		95% Modified-t UCL (Johnson-1978)	150.5

Gamma GOF Test

A-D Test Statistic	1.727	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.279	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.21	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.507	k star (bias corrected MLE)	2.928
Theta hat (MLE)	37.01	Theta star (bias corrected MLE)	44.33
nu hat (MLE)	119.3	nu star (bias corrected)	99.54
MLE Mean (bias corrected)	129.8	MLE Sd (bias corrected)	75.86
		Approximate Chi Square Value (0.05)	77.52
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	75.49

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	166.7	Adjusted Gamma UCL (use when n<50)	171.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.601	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.015	Mean of logged Data	4.717
Maximum of Logged Data	5.489	SD of logged Data	0.75

Assuming Lognormal Distribution

95% H-UCL	228.4	90% Chebyshev (MVUE) UCL	229.7
95% Chebyshev (MVUE) UCL	268	97.5% Chebyshev (MVUE) UCL	321.1
99% Chebyshev (MVUE) UCL	425.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	149.4	95% Jackknife UCL	150.6
95% Standard Bootstrap UCL	149	95% Bootstrap-t UCL	148.9
95% Hall's Bootstrap UCL	152	95% Percentile Bootstrap UCL	148.9
95% BCA Bootstrap UCL	148.9		
90% Chebyshev(Mean, Sd) UCL	165.6	95% Chebyshev(Mean, Sd) UCL	181.8
97.5% Chebyshev(Mean, Sd) UCL	204.3	99% Chebyshev(Mean, Sd) UCL	248.5

Suggested UCL to Use

95% Student's-t UCL 150.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Cadmium (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	0.06	Mean	0.501
Maximum	3.4	Median	0.32
SD	0.77	Std. Error of Mean	0.187
Coefficient of Variation	1.538	Skewness	3.736

Normal GOF Test

Shapiro Wilk Test Statistic	0.477	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.827	5% Adjusted-CLT UCL (Chen-1995)	0.988
		5% Modified-t UCL (Johnson-1978)	0.855

Gamma GOF Test

A-D Test Statistic	1.182	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.764	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.215	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.12	k star (bias corrected MLE)	0.962
Theta hat (MLE)	0.447	Theta star (bias corrected MLE)	0.52
nu hat (MLE)	38.09	nu star (bias corrected)	32.7
MLE Mean (bias corrected)	0.501	MLE Sd (bias corrected)	0.51
		pproximate Chi Square Value (0.05)	20.63
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	19.63

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.794	sted Gamma UCL (use when n<50)	0.834

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.813	Mean of logged Data	-1.201
Maximum of Logged Data	1.224	SD of logged Data	0.947

Assuming Lognormal Distribution

95% H-UCL	0.871	90% Chebyshev (MVUE) UCL	0.799
95% Chebyshev (MVUE) UCL	0.954	97.5% Chebyshev (MVUE) UCL	1.17
99% Chebyshev (MVUE) UCL	1.595		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.808	95% Jackknife UCL	0.827
95% Standard Bootstrap UCL	0.798	95% Bootstrap-t UCL	1.713
95% Hall's Bootstrap UCL	2.105	95% Percentile Bootstrap UCL	0.853
95% BCA Bootstrap UCL	1.012		
90% Chebyshev(Mean, Sd) UCL	1.061	95% Chebyshev(Mean, Sd) UCL	1.314
97.5% Chebyshev(Mean, Sd) UCL	1.666	99% Chebyshev(Mean, Sd) UCL	2.358

Suggested UCL to Use

95% H-UCL 0.871

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Molybdenum (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.37	Mean	1.111
Maximum	5.05	Median	0.7
SD	1.166	Std. Error of Mean	0.283
Coefficient of Variation	1.05	Skewness	2.973

Normal GOF Test

Shapiro Wilk Test Statistic	0.512	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.386	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.604	5% Adjusted-CLT UCL (Chen-1995)	1.794
		95% Modified-t UCL (Johnson-1978)	1.638

Gamma GOF Test

A-D Test Statistic	2.777	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.322	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.212	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.104	k star (bias corrected MLE)	1.772
Theta hat (MLE)	0.528	Theta star (bias corrected MLE)	0.627
nu hat (MLE)	71.54	nu star (bias corrected)	60.25
MLE Mean (bias corrected)	1.111	MLE Sd (bias corrected)	0.834
		pproximate Chi Square Value (0.05)	43.4
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	41.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.542	sted Gamma UCL (use when n<50)	1.597

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.722	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.293	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.994	Mean of logged Data	-0.151
Maximum of Logged Data	1.619	SD of logged Data	0.62

Assuming Lognormal Distribution

95% H-UCL	1.457	90% Chebyshev (MVUE) UCL	1.514
95% Chebyshev (MVUE) UCL	1.735	97.5% Chebyshev (MVUE) UCL	2.04
99% Chebyshev (MVUE) UCL	2.641		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.576	95% Jackknife UCL	1.604
95% Standard Bootstrap UCL	1.577	95% Bootstrap-t UCL	4.075
95% Hall's Bootstrap UCL	4.171	95% Percentile Bootstrap UCL	1.618
95% BCA Bootstrap UCL	1.752		
90% Chebyshev(Mean, Sd) UCL	1.959	95% Chebyshev(Mean, Sd) UCL	2.343
97.5% Chebyshev(Mean, Sd) UCL	2.877	99% Chebyshev(Mean, Sd) UCL	3.925

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 2.343

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Nickel (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	7.6	Mean	13.95
Maximum	28.6	Median	12.3
SD	5.423	Std. Error of Mean	1.315
Coefficient of Variation	0.389	Skewness	1.32

Normal GOF Test

Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16.24	5% Adjusted-CLT UCL (Chen-1995)	16.56
		95% Modified-t UCL (Johnson-1978)	16.31

Gamma GOF Test

A-D Test Statistic	0.432	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.155	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.173	k star (bias corrected MLE)	6.77
Theta hat (MLE)	1.706	Theta star (bias corrected MLE)	2.06
nu hat (MLE)	277.9	nu star (bias corrected)	230.2
MLE Mean (bias corrected)	13.95	MLE Sd (bias corrected)	5.36
		Approximate Chi Square Value (0.05)	196.1
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	192.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	16.37	Adjusted Gamma UCL (use when n<50)	16.65

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.132	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.028	Mean of logged Data	2.573
Maximum of Logged Data	3.353	SD of logged Data	0.355

Assuming Lognormal Distribution

95% H-UCL	16.52	90% Chebyshev (MVUE) UCL	17.55
95% Chebyshev (MVUE) UCL	19.21	97.5% Chebyshev (MVUE) UCL	21.51
99% Chebyshev (MVUE) UCL	26.02		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	16.11	95% Jackknife UCL	16.24
95% Standard Bootstrap UCL	16.05	95% Bootstrap-t UCL	17.01
95% Hall's Bootstrap UCL	17.12	95% Percentile Bootstrap UCL	16.16
95% BCA Bootstrap UCL	16.45		
90% Chebyshev(Mean, Sd) UCL	17.89	95% Chebyshev(Mean, Sd) UCL	19.68
97.5% Chebyshev(Mean, Sd) UCL	22.16	99% Chebyshev(Mean, Sd) UCL	27.03

Suggested UCL to Use

95% Student's-t UCL 16.24

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Selenium (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	0.105	Mean	0.951
Maximum	4.2	Median	0.47
SD	1.08	Std. Error of Mean	0.262
Coefficient of Variation	1.136	Skewness	1.971

Normal GOF Test

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.409	5% Adjusted-CLT UCL (Chen-1995)	1.516
		95% Modified-t UCL (Johnson-1978)	1.43

Gamma GOF Test

A-D Test Statistic	0.607	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.764	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.208	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.077	k star (bias corrected MLE)	0.926
Theta hat (MLE)	0.883	Theta star (bias corrected MLE)	1.027
nu hat (MLE)	36.61	nu star (bias corrected)	31.48
MLE Mean (bias corrected)	0.951	MLE Sd (bias corrected)	0.988
		pproximate Chi Square Value (0.05)	19.66
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	18.68

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.523	sted Gamma UCL (use when n<50)	1.603

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.254	Mean of logged Data	-0.582
Maximum of Logged Data	1.435	SD of logged Data	1.067

Assuming Lognormal Distribution

95% H-UCL	2.066	90% Chebyshev (MVUE) UCL	1.754
95% Chebyshev (MVUE) UCL	2.122	97.5% Chebyshev (MVUE) UCL	2.634
99% Chebyshev (MVUE) UCL	3.638		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.382	95% Jackknife UCL	1.409
95% Standard Bootstrap UCL	1.369	95% Bootstrap-t UCL	1.659
95% Hall's Bootstrap UCL	1.673	95% Percentile Bootstrap UCL	1.386
95% BCA Bootstrap UCL	1.53		
90% Chebyshev(Mean, Sd) UCL	1.737	95% Chebyshev(Mean, Sd) UCL	2.093
97.5% Chebyshev(Mean, Sd) UCL	2.588	99% Chebyshev(Mean, Sd) UCL	3.558

Suggested UCL to Use

95% Adjusted Gamma UCL 1.603

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Thallium (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	0.075	Mean	2.207
Maximum	9.65	Median	0.95
SD	2.747	Std. Error of Mean	0.666
Coefficient of Variation	1.245	Skewness	1.896

Normal GOF Test

Shapiro Wilk Test Statistic	0.702	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.37	5% Adjusted-CLT UCL (Chen-1995)	3.63
		95% Modified-t UCL (Johnson-1978)	3.421

Gamma GOF Test

A-D Test Statistic	0.848	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.769	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.24	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.216	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.924	k star (bias corrected MLE)	0.8
Theta hat (MLE)	2.389	Theta star (bias corrected MLE)	2.759
nu hat (MLE)	31.41	nu star (bias corrected)	27.2
MLE Mean (bias corrected)	2.207	MLE Sd (bias corrected)	2.468
		Approximate Chi Square Value (0.05)	16.3
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	15.42

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	3.682	Adjusted Gamma UCL (use when n<50)	3.892

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.59	Mean of logged Data	0.161
Maximum of Logged Data	2.267	SD of logged Data	1.196

Assuming Lognormal Distribution

95% H-UCL	5.848	90% Chebyshev (MVUE) UCL	4.468
95% Chebyshev (MVUE) UCL	5.473	97.5% Chebyshev (MVUE) UCL	6.867
99% Chebyshev (MVUE) UCL	9.606		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3.303	95% Jackknife UCL	3.37
95% Standard Bootstrap UCL	3.24	95% Bootstrap-t UCL	4.295
95% Hall's Bootstrap UCL	3.862	95% Percentile Bootstrap UCL	3.313
95% BCA Bootstrap UCL	3.601		
90% Chebyshev(Mean, Sd) UCL	4.206	95% Chebyshev(Mean, Sd) UCL	5.111
97.5% Chebyshev(Mean, Sd) UCL	6.368	99% Chebyshev(Mean, Sd) UCL	8.836

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 5.111

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Uranium (mg/kg)

General Statistics

Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	3.35	Mean	5.457
Maximum	8.8	Median	6.15
SD	2.099	Std. Error of Mean	0.793
Coefficient of Variation	0.385	Skewness	0.367

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.999	5% Adjusted-CLT UCL (Chen-1995)	6.88
		95% Modified-t UCL (Johnson-1978)	7.017

Gamma GOF Test

A-D Test Statistic	0.577	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.269	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.776	k star (bias corrected MLE)	4.539
Theta hat (MLE)	0.702	Theta star (bias corrected MLE)	1.202
nu hat (MLE)	108.9	nu star (bias corrected)	63.54
MLE Mean (bias corrected)	5.457	MLE Sd (bias corrected)	2.562
		pproximate Chi Square Value (0.05)	46.2
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	41.77

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	7.505	sted Gamma UCL (use when n<50)	8.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.252	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.209	Mean of logged Data	1.631
Maximum of Logged Data	2.175	SD of logged Data	0.395

Assuming Lognormal Distribution

95% H-UCL	7.983	90% Chebyshev (MVUE) UCL	7.915
95% Chebyshev (MVUE) UCL	9.027	97.5% Chebyshev (MVUE) UCL	10.57
99% Chebyshev (MVUE) UCL	13.6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	6.762	95% Jackknife UCL	6.999
95% Standard Bootstrap UCL	6.65	95% Bootstrap-t UCL	7.126
95% Hall's Bootstrap UCL	6.644	95% Percentile Bootstrap UCL	6.686
95% BCA Bootstrap UCL	6.771		
90% Chebyshev(Mean, Sd) UCL	7.837	95% Chebyshev(Mean, Sd) UCL	8.915
97.5% Chebyshev(Mean, Sd) UCL	10.41	99% Chebyshev(Mean, Sd) UCL	13.35

Suggested UCL to Use

95% Student's-t UCL	6.999

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Table G-1-17. UCL Statistics for Combined, Uncensored Latty Avenue Surface Soil Metals Data - Parcel 10K530087 and VP-02(L)

Vanadium (mg/kg)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	13.6	Mean	20.63
Maximum	31.5	Median	19.8
SD	5.221	Std. Error of Mean	1.266
Coefficient of Variation	0.253	Skewness	0.523

Normal GOF Test

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.126	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	22.84	5% Adjusted-CLT UCL (Chen-1995)	22.88
		95% Modified-t UCL (Johnson-1978)	22.87

Gamma GOF Test

A-D Test Statistic	0.264	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.116	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.05	k star (bias corrected MLE)	14.08
Theta hat (MLE)	1.21	Theta star (bias corrected MLE)	1.465
nu hat (MLE)	579.7	nu star (bias corrected)	478.7
MLE Mean (bias corrected)	20.63	MLE Sd (bias corrected)	5.498
		pproximate Chi Square Value (0.05)	429
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	424.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	23.02	sted Gamma UCL (use when n<50)	23.29

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.61	Mean of logged Data	2.997
Maximum of Logged Data	3.45	SD of logged Data	0.25

Assuming Lognormal Distribution

95% H-UCL	23.17	90% Chebyshev (MVUE) UCL	24.42
95% Chebyshev (MVUE) UCL	26.13	97.5% Chebyshev (MVUE) UCL	28.51
99% Chebyshev (MVUE) UCL	33.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	22.71	95% Jackknife UCL	22.84
95% Standard Bootstrap UCL	22.71	95% Bootstrap-t UCL	23.06
95% Hall's Bootstrap UCL	22.87	95% Percentile Bootstrap UCL	22.75
95% BCA Bootstrap UCL	22.73		
90% Chebyshev(Mean, Sd) UCL	24.43	95% Chebyshev(Mean, Sd) UCL	26.15
97.5% Chebyshev(Mean, Sd) UCL	28.54	99% Chebyshev(Mean, Sd) UCL	33.23

Suggested UCL to Use

95% Student's-t UCL 22.84

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-18. UCL Statistics for Combined, Uncensored Latty Avenue Subsurface Soil Metals Data - HISS, Parcel 10K530087, VP-02(L), and Futura

User Selected Options	
Date/Time of Computation	10/13/2014 8:35:54 AM
From File	Latty SB ProUCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Antimony (mg/kg)

General Statistics

Total Number of Observations	48	Number of Distinct Observations	34
		Number of Missing Observations	0
Minimum	0.195	Mean	3.421
Maximum	76.6	Median	1.02
SD	11.24	Std. Error of Mean	1.622
Coefficient of Variation	3.285	Skewness	6.195

Normal GOF Test

Shapiro Wilk Test Statistic	0.283	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.411	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.128	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.142	5% Adjusted-CLT UCL (Chen-1995)	7.638
		5% Modified-t UCL (Johnson-1978)	6.384

Gamma GOF Test

A-D Test Statistic	4.262	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.811	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.251	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.135	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.533	k star (bias corrected MLE)	0.514
Theta hat (MLE)	6.418	Theta star (bias corrected MLE)	6.66
nu hat (MLE)	51.17	nu star (bias corrected)	49.31
MLE Mean (bias corrected)	3.421	MLE Sd (bias corrected)	4.773
		Approximate Chi Square Value (0.05)	34.19
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	33.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	4.934	Adjusted Gamma UCL (use when n<50)	4.991

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0986	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.128	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.635	Mean of logged Data	0.0499
Maximum of Logged Data	4.339	SD of logged Data	1.261

Assuming Lognormal Distribution

95% H-UCL	3.776	90% Chebyshev (MVUE) UCL	3.809
95% Chebyshev (MVUE) UCL	4.51	97.5% Chebyshev (MVUE) UCL	5.482
99% Chebyshev (MVUE) UCL	7.392		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	6.088	95% Jackknife UCL	6.142
95% Standard Bootstrap UCL	6.075	95% Bootstrap-t UCL	18.34
95% Hall's Bootstrap UCL	15.11	95% Percentile Bootstrap UCL	6.366
95% BCA Bootstrap UCL	8.872		
90% Chebyshev(Mean, Sd) UCL	8.286	95% Chebyshev(Mean, Sd) UCL	10.49
97.5% Chebyshev(Mean, Sd) UCL	13.55	99% Chebyshev(Mean, Sd) UCL	19.56

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	10.49

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-18. UCL Statistics for Combined, Uncensored Latty Avenue Subsurface Soil Metals Data - HISS, Parcel 10K530087, VP-02(L), and Futura

Arsenic (mg/kg)

General Statistics

Total Number of Observations	48	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	1.9	Mean	8.877
Maximum	26	Median	7.85
SD	5.276	Std. Error of Mean	0.762
Coefficient of Variation	0.594	Skewness	1.037

Normal GOF Test

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.128	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.15	5% Adjusted-CLT UCL (Chen-1995)	10.25
		5% Modified-t UCL (Johnson-1978)	10.17

Gamma GOF Test

A-D Test Statistic	0.292	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0836	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.833	k star (bias corrected MLE)	2.67
Theta hat (MLE)	3.133	Theta star (bias corrected MLE)	3.325
nu hat (MLE)	272	nu star (bias corrected)	256.3
MLE Mean (bias corrected)	8.877	MLE Sd (bias corrected)	5.433
		Approximate Chi Square Value (0.05)	220.3
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	219.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	10.33	Adjusted Gamma UCL (use when n<50)	10.38

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.128	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.642	Mean of logged Data	1.997
Maximum of Logged Data	3.258	SD of logged Data	0.651

Assuming Lognormal Distribution

95% H-UCL	11	90% Chebyshev (MVUE) UCL	11.81
95% Chebyshev (MVUE) UCL	13.06	97.5% Chebyshev (MVUE) UCL	14.8
99% Chebyshev (MVUE) UCL	18.21		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10.13	95% Jackknife UCL	10.15
95% Standard Bootstrap UCL	10.11	95% Bootstrap-t UCL	10.31
95% Hall's Bootstrap UCL	10.24	95% Percentile Bootstrap UCL	10.19
95% BCA Bootstrap UCL	10.18		
90% Chebyshev(Mean, Sd) UCL	11.16	95% Chebyshev(Mean, Sd) UCL	12.2
97.5% Chebyshev(Mean, Sd) UCL	13.63	99% Chebyshev(Mean, Sd) UCL	16.45

Suggested UCL to Use

95% Student's-t UCL 10.15

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-18. UCL Statistics for Combined, Uncensored Latty Avenue Subsurface Soil Metals Data - HISS, Parcel 10K530087, VP-02(L), and Futura

Thallium (mg/kg)

General Statistics

Total Number of Observations	48	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	0.085	Mean	2.886
Maximum	10.6	Median	1.85
SD	2.97	Std. Error of Mean	0.429
Coefficient of Variation	1.029	Skewness	1.465

Normal GOF Test

Shapiro Wilk Test Statistic	0.764	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.128	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.605	5% Adjusted-CLT UCL (Chen-1995)	3.688
		5% Modified-t UCL (Johnson-1978)	3.62

Gamma GOF Test

A-D Test Statistic	0.95	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.777	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.125	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.131	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.09	k star (bias corrected MLE)	1.036
Theta hat (MLE)	2.647	Theta star (bias corrected MLE)	2.785
nu hat (MLE)	104.7	nu star (bias corrected)	99.46
MLE Mean (bias corrected)	2.886	MLE Sd (bias corrected)	2.835
		Approximate Chi Square Value (0.05)	77.45
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	76.85

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	3.705	Adjusted Gamma UCL (use when n<50)	3.734

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.128	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.465	Mean of logged Data	0.536
Maximum of Logged Data	2.361	SD of logged Data	1.104

Assuming Lognormal Distribution

95% H-UCL	4.664	90% Chebyshev (MVUE) UCL	4.858
95% Chebyshev (MVUE) UCL	5.662	97.5% Chebyshev (MVUE) UCL	6.779
99% Chebyshev (MVUE) UCL	8.972		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3.591	95% Jackknife UCL	3.605
95% Standard Bootstrap UCL	3.585	95% Bootstrap-t UCL	3.776
95% Hall's Bootstrap UCL	3.709	95% Percentile Bootstrap UCL	3.596
95% BCA Bootstrap UCL	3.635		
90% Chebyshev(Mean, Sd) UCL	4.172	95% Chebyshev(Mean, Sd) UCL	4.754
97.5% Chebyshev(Mean, Sd) UCL	5.563	99% Chebyshev(Mean, Sd) UCL	7.151

Suggested UCL to Use

95% Adjusted Gamma UCL	3.734

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-18. UCL Statistics for Combined, Uncensored Latty Avenue Subsurface Soil Metals Data - HISS, Parcel 10K530087, VP-02(L), and Futura

Uranium (mg/kg)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	2.1	Mean	9.434
Maximum	33.75	Median	6.95
SD	8.618	Std. Error of Mean	2.155
Coefficient of Variation	0.913	Skewness	2.148

Normal GOF Test

Shapiro Wilk Test Statistic	0.705	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.21	5% Adjusted-CLT UCL (Chen-1995)	14.21
		5% Modified-t UCL (Johnson-1978)	13.4

Gamma GOF Test

A-D Test Statistic	0.787	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.88	k star (bias corrected MLE)	1.569
Theta hat (MLE)	5.018	Theta star (bias corrected MLE)	6.012
nu hat (MLE)	60.17	nu star (bias corrected)	50.22
MLE Mean (bias corrected)	9.434	MLE Sd (bias corrected)	7.531
		Approximate Chi Square Value (0.05)	34.95
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	33.5

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	13.56	sted Gamma UCL (use when n<50)	14.14

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.742	Mean of logged Data	1.955
Maximum of Logged Data	3.519	SD of logged Data	0.76

Assuming Lognormal Distribution

95% H-UCL	14.97	90% Chebyshev (MVUE) UCL	14.82
95% Chebyshev (MVUE) UCL	17.36	97.5% Chebyshev (MVUE) UCL	20.88
99% Chebyshev (MVUE) UCL	27.79		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	12.98	95% Jackknife UCL	13.21
95% Standard Bootstrap UCL	12.89	95% Bootstrap-t UCL	19.16
95% Hall's Bootstrap UCL	35.38	95% Percentile Bootstrap UCL	13.16
95% BCA Bootstrap UCL	14		
90% Chebyshev(Mean, Sd) UCL	15.9	95% Chebyshev(Mean, Sd) UCL	18.83
97.5% Chebyshev(Mean, Sd) UCL	22.89	99% Chebyshev(Mean, Sd) UCL	30.87

Suggested UCL to Use

95% Adjusted Gamma UCL	14.14

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-1-19. Latty Avenue Surface Soil Exposure Point Concentrations: Parcel 10K530087 and VP-02(L)

COC	EPC (mg/kg)	Basis
Antimony	15.39	Chebyshev UCL_{95}
Arsenic	24.86	Chebyshev UCL_{95}
Barium	150.6	Student's-t UCL_{95}
Cadmium	0.871	Lognormal UCL_{95}
Chromium	Not a COC	Student's-t UCL_{95}
Molybdenum	2.343	Chebyshev UCL_{95}
Nickel	16.24	Student's-t UCL_{95}
Selenium	1.603	Adjusted Gamma UCL_{95}
Thallium	5.111	Chebyshev UCL_{95}
Uranium	Not a COC	Student's-t UCL_{95}
Vanadium	22.84	Student's-t UCL_{95}

Table G-1-20. Latty Avenue Subsurface Soil Exposure Point Concentrations: HISS, Parcel 10K530087, VP-02(L), and Futura

COC	EPC (mg/kg)	Basis
Antimony	10.49	Chebyshev UCL_{95}
Arsenic	10.15	Student's-t UCL_{95}
Thallium	3.734	Adjusted Gamma UCL_{95}
Uranium	Not a COC	Adjusted Gamma UCL_{95}

ATTACHMENT G-2
REVISED EXPOSURE POINT CONCENTRATION CALCULATIONS FOR THE ST. LOUIS AIRPORT SITE

(On CD-ROM on the Back Cover of this Report)

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LIST OF TABLES

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Table G-2-1. SLAPS Soil Metals Data

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
1, 11, CWC	SLA81208	SLA81208	859829	1065275	0.3	U	9.7	=	149	=	0.2	=	17.4	=	1.6	U	16.2	=	0.4	U	1.2	U	14.8	U	26.9	=
1, 11, CWC	SLA81218	SLA81218	859815	1065202	0.3	U	3.4	=	94	=	0.1	=	26.7	=	1.7	U	9.6	=	0.4	U	1.3	U	15.0	U	19.3	=
1, 11, CWC	SLA81403	SLA81403	859928	1065508	0.3	U	19.5	=	130	=	0.1	=	17.8	=	1.7	U	19.8	=	0.4	U	2.3	=	15.0	U	31.7	=
1, 11, CWC	SLA81384	SLA81384	859900	1065323	0.3	U	7.8	=	241	=	0.1	=	20.6	=	1.6	U	16.4	=	0.4	U	2.1	=	14.6	U	35.2	=
1, 11, CWC	SLA84300	SLA84300	860001	1065361	0.3	U	4.7	=	175	=	0.0	U	19.9	=	1.6	U	17.4	=	0.5	=	3.6	=	14.5	U	25.8	=
1, 11, CWC	SLA86333	SLA86333	859965	1065223	1.3	U	7.0	=	330	=	0.7	U	16.5	=	2.2	=	26.4	=	0.7	U	1.0	=	66.9	U	34.3	=
1, 11, CWC	SLA86528	SLA86528	859982	1065185	1.3	U	9.3	=	276	=	0.7	U	17.7	=	2.0	=	17.9	=	0.7	U	1.8	=	64.5	U	29.6	=
1, 11, CWC	SLA81381	SLA81381	859797	1065323	0.6	=	259.0	=	130	=	0.6	=	17.3	=	1.6	U	15.8	=	0.4	U	1.2	U	14.0	U	25.8	=
2	SLA77582	SLA77582	860702	1065572	0.5	J	7.9	=	113	=	0.2	=	12.7	=	4.3	=	17.6	=	0.6	U	2.6	J	6.1	=	28.5	=
2	SLA77667	SLA77667	860661	1065357	0.6	U	6.9	=	94	=	0.1	U	16.9	=	0.2	U	20.3	=	0.3	U	3.3	=	3.8	=	31.7	=
2	SLA78890	SLA78890	860614	1065565	0.2	J	8.9	=	128	=	0.0	U	16.6	=	0.4	=	22.3	=	0.3	U	2.5	=	14.4	=	27.9	=
2	SLA78904	SLA78904	860614	1065445	0.2	UJ	9.7	=	149	=	0.7	=	12.1	=	0.7	=	29.7	=	0.3	U	2.1	=	1.2	U	26.7	=
2	SLA79083	SLA79083	860425	1065475	0.4	UJ	2.2	=	112	=	0.4	U	12.6	=	0.4	U	21.5	=	0.3	U	0.5	U	8.3	=	20.4	=
2	SLA79089	SLA79089	860493	1065415	0.3	UJ	8.3	=	139	=	0.3	U	12.6	=	0.9	U	17.5	=	0.3	U	0.5	U	3.3	=	27.2	=
2	SLA80178	SLA80178	860545	1065326	0.2	UJ	12.2	=	140	=	0.4	U	21.2	=	0.1	U	28.0	=	0.3	U	3.6	U	1.2	U	38.5	=
2	SLA80190	SLA80190	860511	1065386	0.2	UJ	10.4	=	164	=	0.4	U	15.0	=	0.7	U	16.2	=	0.3	U	2.4	U	1.2	U	29.9	U
2	SLA80466	SLA80466	860253	1065415	0.4	U	4.5	J	57	=	0.2	U	18.6	=	0.9	U	15.4	J	0.9	=	1.7	=	18.0	U	27.1	=
2	SLA80467	SLA80467	860287	1065415	0.4	U	6.0	J	72	=	0.2	U	18.4	=	1.5	=	17.1	J	1.3	=	2.2	=	27.2	=	35.7	=
2	SLA80470	SLA80470	860321	1065415	0.4	U	8.0	J	91	=	0.2	U	16.6	=	1.1	=	15.3	J	1.0	=	2.6	=	17.5	U	27.9	=
2	SLA80471	SLA80471	860339	1065445	0.4	U	7.1	J	79	=	0.2	U	16.6	=	1.0	=	13.3	J	0.2	=	2.2	=	17.8	U	24.5	=
2	SLA83471	SLA83471	860146	1065435	0.2	U	0.2	U	202	=	0.0	U	14.9	=	0.1	U	17.2	=	0.6	=	0.5	U	15.4	U	20.7	=
2	SLA83479	SLA83479	860161	1065461	7.8	U	4.5	=	166	=	0.0	U	11.7	=	0.2	=	13.4	=	0.5	=	0.5	U	25.1	=	19.4	=
2	SLA83909	SLA83909	860115	1065317	0.2	UJ	3.7	=	126	=	0.0	U	14.9	=	0.4	=	18.2	=	0.3	U	0.5	U	5.8	=	26.2	=
2	SLA83925	SLA83925	860080	1065377	0.2	UJ	8.8	=	204	=	0.0	U	21.3	=	0.1	U	23.7	=	0.3	U	0.4	U	1.2	U	33.6	=
3	SLA81182	SLA81182	860127	1065213	0.4	U	10.2	J	524	=	0.2	U	18.2	=	0.9	U	20.2	J	0.4	=	2.6	=	17.8	U	27.7	=
3	SLA84991	SLA84991	860259	1065342	0.5	U	3.0	J	54	=	0.2	U	16.4	=	2.0	=	12.5	J	1.2	=	2.7	=	18.9	U	18.0	=
3	SLA84994	SLA84994	860311	1065312	0.4	U	7.1	J	129	=	0.2	U	18.3	=	0.9	U	16.5	J	1.5	=	2.3	=	17.8	U	27.3	=
3	SLA84998	SLA84998	860382	1065312	0.4	U	4.0	J	42	=	0.2	U	16.4	=	2.1	=	12.5	J	1.2	=	1.5	=	17.8	U	24.7	=
3	SLA85004	SLA85004	860276	1065373	0.4	U	23.3	J	1450	=	1.0	=	17.6	=	3.8	=	62.7	J	1.4	=	3.2	=	26.9	=	52.1	=
3	SLA85005	SLA85005	860311	1065373	0.4	U	9.5	J	96	=	0.2	U	16.7	=	1.3	=	19.1	J	1.9	=	2.6	=	17.5	U	33.2	=
3	SLA86527	SLA86527	860014	1065185	1.3	U	4.7	=	343	=	0.6	U	17.5	=	2.0	=	19.8	=	0.6	U	1.3	=	63.2	U	24.2	=
3	SLA86601	SLA86601	860163	1065294	0.4	U	2.1	J	87	=	0.2	U	17.9	=	0.9	U	15.1	J	0.9	=	1.5	=	17.8	U	18.8	=
3	SLA86607	SLA86607	860163	1065250	0.4	U	5.2	J	199	=	0.2	U	14.0	=	0.9	U	18.3	J	0.7	=	2.3	=	17.7	U	22.1	=
3	SLA86704	SLA86704	860197	1065180	1.5	=	0.4	=	80	=	9.7	J	42.4	J	0.9	U	14.1	J	0.5	=	0.7	U	18.6	U	18.0	=
3	SLA86708	SLA86708[c]	860245	1065208	50.1	=	221.0	=	155	=	167.0	J	85.9	J	0.9	U	19.5	J	85.0	=	115.0	=	16.9	U	22.5	=
3	SLA87086	SLA87086	860280	1065180	0.4	U	9.0	J	293	=	0.2	U	16.5	=	3.3	=	16.0	J	1.2	=	2.5	=	17.1	U	26.5	=
3	SLA87495	SLA87495	860382	1065201	0.4	U	8.7	J	144	=	0.1	U	16.1	=	0.8	=	17.6	J	0.6	=	3.1	=	15.6	U	27.6	=
3	SLA87624	SLA87624	860397	1065256	0.4	U	15.8	J	843	=	0.2	U	21.3	=	0.9	U	31.9	J	0.6	=	4.0	=	17.5	U	75.3	=
3	SLA87634	SLA87634	860445	1065172	0.4	U	9.0	J	228	=	0.2	=	14.9	=	0.9	U	26.6	J	0.5	=	2.0	=	17.7	U	30.3	=
3	SLA87947	SLA87947	860512	1065270	0.4	UJ	2.6	=	69	=	0.2	U	17.0	=	0.6	U	11.9	=	0.2	U	1.0	=	8.8	U	20.9	=
3	SLA88763	SLA88763[a, c]	860245	1065208	0.4	UJ	4.6	=	*	*	*	*	*	*	*	*	*	*	*	*	1.5	=	*	*	*	*
3	SLA88764	SLA88764[a, c]	860249	1065210	0.4	UJ	1.7	=	*	*	*	*	*	*	*	*	*	*	*	*	1.4	=	*	*	*	*
3	SLA88765	SLA88765[a, c]	860242	1065212	0.4	UJ	6.4	=	*	*	*	*	*	*	*	*	*	*	*	*	1.7	=	*	*	*	*
3	SLA88766	SLA88766[a, c]	860243	1065204	0.4	UJ	1.2	=	*	*	*	*	*	*	*	*	*	*	*	*	0.7	=	*	*	*	*
3	SLA88774	SLA88774	860595	1065170	0.4	U	4.0	=	99	=	0.2	U	17.4	=	0.6	U	12.7	=	0.2	U	0.8	=	9.4	U	26.0	=

Table G-2-1. SLAPS Soil Metals Data

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
4	SLA07777	SLA07777	861341	1065541	0.3	U	26.9	=	115	=	0.8	U	15.2	=	1.4	U	19.2	=	1.3	U	1.4	=	4.6	U	32.4	=
4	SLA07783	SLA07783	861234	1065561	0.3	U	7.2	=	125	=	0.7	U	15.9	=	2.7	=	17.7	=	0.4	U	0.9	U	19.1	=	26.5	=
4	SLA07802	SLA07802	861195	1065492	0.3	UJ	4.7	=	209	J	0.5	=	13.0	=	5.9	=	17.8	=	1.3	=	0.4	U	3.4	U	22.3	=
4	SLA07809	SLA07809	861212	1065522	0.4	UJ	22.7	=	257	J	0.8	=	14.3	=	0.9	=	19.2	=	3.1	=	0.4	U	8.8	=	30.5	=
4	SLA07835	SLA07835	860760	1065566	0.4	J	7.0	=	173	J	0.5	=	15.1	=	0.7	=	15.7	=	0.3	U	0.4	U	3.6	U	28.6	=
4	SLA08032	SLA08032	861048	1065513	1.3	UJ	8.6	=	132	=	0.5	U	14.2	=	0.8	U	19.2	=	1.6	=	0.4	U	3.6	U	29.4	=
4	SLA08055	SLA08055	860970	1065486	0.7	UJ	5.7	=	206	=	0.5	U	14.5	=	1.1	U	17.8	=	1.4	=	0.4	U	3.6	U	27.2	=
4	SLA73388	SLA73388	860931	1065481	8.1	U	1.6	=	54	=	0.7	U	16.8	=	5.4	U	10.4	=	1.6	=	1.3	U	14.2	=	19.7	=
5	SLA27553	SLA27553	861536	1065438	1.0	U	12.7	=	160	=	0.5	=	17.2	=	5.6	=	24.9	=	0.3	=	0.0	U	16.6	U	35.5	=
5	SLA27561	SLA27561	861477	1065489	0.9	U	9.1	=	215	=	0.9	=	17.9	=	7.5	=	38.2	=	1.0	=	0.3	=	15.5	U	35.0	=
5	SLA65200	SLA65200	861402	1065341	0.3	UJ	3.6	=	228	=	0.2	=	10.4	=	0.7	=	18.1	=	0.3	U	0.4	=	6.6	U	22.4	=
5	SLA65210	SLA65210	861402	1065388	0.3	J	10.2	=	169	=	0.1	U	17.2	=	1.8	=	18.9	=	0.2	=	0.6	=	5.8	U	31.1	=
5	SLA65780	SLA65780	861372	1065377	0.3	UJ	9.4	=	162	=	0.3	=	13.0	=	2.2	=	22.2	=	0.2	=	1.3	U	5.9	U	28.5	=
5	SLA65789	SLA65789	861386	1065452	0.3	UJ	4.4	=	100	=	0.1	U	13.7	=	0.2	=	10.8	=	0.5	=	1.2	U	6.0	U	29.8	=
5	SLA66590	SLA66590	861614	1065266	0.3	UJ	3.2	=	50	=	0.4	=	8.7	=	0.2	U	9.8	=	1.3	=	0.3	U	3.0	U	16.6	=
5	SLA66600	SLA66600	861553	1065320	0.3	UJ	1.2	=	78	=	0.1	U	9.7	=	0.2	U	7.5	=	0.3	=	0.3	U	2.7	U	11.4	=
5	SLA70799	SLA70799	861232	1065453	0.5	U	9.6	=	128	=	0.1	U	12.3	=	0.9	U	15.7	=	1.3	=	2.4	=	3.1	U	28.1	=
5	SLA70811	SLA70811	861246	1065374	0.4	U	6.6	=	200	=	0.2	U	11.6	=	3.4	U	26.6	=	0.2	U	2.2	=	3.1	U	24.9	=
5	SLA71065	SLA71065	861190	1065436	0.3	J	7.6	=	157	=	0.6	U	13.1	=	2.1	=	13.9	=	3.6	=	1.1	U	59.1	U	27.2	=
5	SLA71080	SLA71080	861158	1065324	1.2	UJ	6.5	=	183	=	0.4	U	13.3	=	1.1	=	20.9	=	0.6	U	1.4	=	58.9	U	24.5	=
5	SLA72621	SLA72621	861045	1065472	7.6	UJ	6.8	=	70	=	0.6	U	12.1	=	5.1	U	11.3	=	5.0	=	0.7	U	63.5	U	25.1	=
5	SLA72640	SLA72640	861013	1065301	7.5	UJ	2.7	=	58	=	0.6	U	16.0	=	5.0	U	12.5	=	1.2	=	1.0	U	62.8	U	26.8	=
5	SLA73924	SLA73924	860911	1065317	0.3	U	2.6	=	35	=	0.6	U	16.5	=	5.1	U	9.5	=	1.1	=	1.4	=	8.9	U	23.9	=
5	SLA73940	SLA73940	860911	1065421	7.7	U	2.6	=	39	=	0.6	U	17.0	=	5.1	U	11.3	=	1.6	=	1.4	=	64.0	U	20.8	=
5	SLA74950	SLA74950	860813	1065304	0.3	U	9.1	=	322	=	0.3	U	17.8	=	0.7	U	19.9	=	1.2	J	0.2	U	9.8	U	39.5	=
5	SLA74955	SLA74955	860767	1065331	0.3	U	3.7	=	78	=	0.3	U	19.4	=	1.2	=	14.2	=	1.3	J	0.2	U	9.8	U	36.2	=
5	SLA88794	SLA88794	860695	1065213	0.4	U	12.1	J	106	=	0.2	U	22.5	=	0.6	U	10.8	=	0.5	=	2.5	=	9.4	U	33.9	=
5	SLA88828	SLA88828	860738	1065254	0.4	U	3.6	=	109	=	0.2	U	14.0	=	0.6	U	11.8	=	0.3	=	2.6	=	8.9	U	21.7	=
5	SLA89141	SLA89141	860762	1065168	0.3	U	6.1	=	196	=	0.5	U	14.6	=	0.9	=	24.7	=	0.2	U	1.9	=	7.4	U	26.0	=
5	SLA89432	SLA89432	860825	1065280	0.4	UJ	3.7	=	92	J	0.2	U	13.0	=	0.6	U	14.5	=	0.2	U	0.7	=	9.2	U	22.0	=
5	SLA89526	SLA89526	860916	1065213	0.4	UJ	5.6	=	74	J	0.2	U	12.7	J	0.6	U	10.1	=	0.2	U	0.9	=	9.5	U	22.1	J
5	SLA91732	SLA91732	860955	1065135	0.9	J	4.9	=	156	=	0.2	U	11.7	J	0.6	U	16.3	=	0.5	=	0.7	U	9.3	U	20.8	=
5	SLA91867	SLA91867	861021	1065219	0.4	U	24.8	=	260	=	0.2	U	16.0	=	2.5	=	23.9	=	0.2	U	7.2	=	9.2	U	34.9	=
5	SLA92516	SLA92516	861051	1065162	0.5	UJ	3.8	J	201	J	0.3	J	10.7	J	1.6	UJ	28.7	J	0.2	UJ	0.2	UJ	27.0	UJ	17.5	J
5	SLA92520	SLA92520	861084	1065105	0.5	UJ	4.5	J	144	J	0.2	UJ	11.3	J	1.6	UJ	17.3	J	0.2	UJ	0.2	UJ	27.4	UJ	20.7	J
5	SLA92861	SLA92861	861133	1065165	0.4	UJ	6.5	J	59	J	0.2	UJ	12.1	J	1.5	UJ	11.6	J	0.2	J	0.2	UJ	25.4	UJ	26.0	J
5	SLA92980	SLA92980	861158	1065271	0.4	U	10.9	=	64	=	0.2	U	12.0	=	1.5	U	12.2	=	1.1	U	1.3	U	25.3	U	26.6	=
5	SLA92985	SLA92985	861192	1065211	0.5	U	3.5	=	117	=	0.2	U	11.0	=	1.6	U	14.1	=	0.2	U	0.9	U	27.0	U	19.3	=
5	SLA93719	SLA93719	861228	1065259	0.4	U	2.8	=	69	=	0.2	U	13.0	=	1.6	U	11.0	=	1.6	=	0.9	=	26.6	U	21.1	=
5	SLA93726	SLA93726	861211	1065175	0.4	U	5.3	=	164	=	0.2	=	11.9	=	1.5	U	21.7	=	0.4	=	1.1	=	25.1	U	27.3	=
5	SLA94138	SLA94138	861289	1065279	0.4	U	8.6	=	270	=	0.2	U	14.0	=	2.6	=	13.3	=	1.3	=	1.6	=	26.5	U	23.6	=
5	SLA94148	SLA94148	861322	1065167	0.4	U	3.5	=	73	=	0.2	U	13.3	=	1.5	U	8.9	=	0.4	=	0.9	=	25.7	U	23.1	=
5	SLA94577	SLA94577	861372	1065233	0.4	U	4.1	=	162	=	0.2	U	10.1	=	1.5	U	23.8	=	0.2	U	1.0	=	24.9	U	23.4	=
5	SLA95111	SLA95111	861404	1065246	0.4	U	1.9	=	183	=	0.2	U	9.1	=	1.4	U	12.9	=	1.6	=	1.9	=	24.6	U	14.5	=
5	SLA95280	SLA95280	861436	1065133	0.4	U	6.6	=	137	=	0.2	U	13.5	=	1.7	=	20.9	=	0.3	=	1.9	=	23.5	U	23.1	=

Table G-2-1. SLAPS Soil Metals Data

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
5	SLA95466	SLA95466	861483	1065128	0.4	U	11.2	=	123	=	0.2	U	13.5	=	2.1	=	17.1	=	0.6	=	0.6	=	24.2	U	27.8	=
6	SLA26637	SLA26637	861834	1065187	0.5	J	7.1	=	108	=	0.0	U	16.1	=	0.5	J	18.6	=	0.3	J	1.5	=	14.8	J	24.1	=
6	SLA26640	SLA26640	861749	1065187	0.3	U	8.7	=	180	=	0.0	U	18.0	=	0.3	J	25.3	=	0.2	J	1.5	=	19.6	J	27.4	=
6	SLA89641	SLA89641	862019	1065060	0.4	UJ	3.8	=	89	J	0.2	U	11.9	J	0.6	U	13.8	=	0.2	U	1.0	=	9.2	U	22.2	J
6	SLA89666	SLA89666	861937	1065120	0.4	U	7.4	=	80	=	0.2	U	12.7	=	0.6	U	15.4	=	0.2	U	0.7	U	9.2	U	28.2	=
6	SLA89672	SLA89672	861965	1065070	0.4	U	21.2	=	98	=	0.2	U	12.4	=	0.7	=	18.4	=	0.2	U	0.7	U	9.2	U	29.2	=
6	SLA97113	SLA97113	861656	1065082	0.4	UJ	7.1	=	160	J	0.2	U	17.5	=	1.6	U	18.4	=	0.4	=	0.2	U	26.8	U	27.8	=
6	SLA97172	SLA97172	861675	1065161	0.4	UJ	5.5	=	139	J	0.2	U	15.6	=	1.5	U	16.7	=	0.2	U	0.2	U	25.5	U	21.7	=
6	SLA97178	SLA97178	861641	1065103	0.4	UJ	10.3	=	77	J	0.2	=	13.6	=	1.5	U	16.1	=	0.2	U	0.2	U	25.3	U	21.4	=
6	SLA97180	SLA97180	861709	1065103	0.4	UJ	1.5	=	65	J	0.2	U	10.7	=	1.5	U	7.6	=	0.2	U	0.2	U	25.6	U	14.8	=
6	SLA98235	SLA98235	861917	1065110	0.4	UJ	3.1	=	73	J	0.2	U	13.9	=	1.5	U	12.1	=	0.2	U	0.2	U	26.2	U	23.4	=
7	SLA05267	SLA05267	862336	1065119	4.4	U	4.7	=	102	=	0.5	U	14.8	=	0.9	U	23.3	=	0.3	U	1.1	J	16.5	U	22.5	=
7	SLA05281	SLA05281	862210	1065182	4.4	U	7.0	=	123	=	0.5	U	14.1	=	0.9	U	19.9	=	0.5	J	1.1	J	16.3	U	24.1	=
7	SLA05293	SLA05293	862095	1065189	4.2	U	8.3	=	194	=	0.5	U	13.4	=	1.3	J	24.7	=	0.3	U	1.8	U	15.6	U	27.0	=
7	SLA05304	SLA05304	862046	1065248	22.9	U	16.4	=	232	=	2.4	U	19.5	=	4.5	U	41.1	=	0.3	U	2.3	U	84.7	U	37.6	=
7	SLA05314	SLA05314	861983	1065280	22.4	U	17.7	=	309	=	2.4	U	21.9	=	4.4	U	65.3	=	0.3	U	3.5	=	82.9	U	45.5	=
7	SLA05324	SLA05324	861920	1065311	5.1	U	8.4	=	138	=	0.5	U	16.1	=	1.4	J	22.7	=	0.5	J	1.6	U	18.7	U	27.1	=
7	SLA06123	SLA06123	862186	1065084	0.3	U	4.9	=	79	=	0.0	U	14.3	=	0.4	=	18.7	=	0.4	U	0.3	U	2.5	U	22.0	=
7	SLA06159	SLA06159	862032	1065143	0.4	U	8.2	=	146	=	0.5	U	16.5	=	1.0	U	20.1	=	1.0	U	0.1	U	1.8	U	26.1	=
7	SLA06162	SLA06162	862077	1065106	0.3	U	6.3	U	65	=	0.0	U	12.0	=	0.5	U	11.7	=	0.5	U	0.2	U	1.8	U	21.9	=
7	SLA25846	SLA25846	861768	1065326	0.7	J	12.2	=	360	=	0.4	UJ	18.3	=	0.6	UJ	51.8	=	0.5	UJ	0.4	J	49.4	J	37.9	=
7	SLA25856	SLA25856	861768	1065379	0.7	J	16.3	=	218	=	0.6	U	17.0	=	0.7	UJ	29.0	=	0.8	U	0.4	J	23.6	J	40.5	=
7	SLA26734	SLA26734	861687	1065389	0.5	J	11.2	=	626	=	0.3	UJ	18.5	=	3.0	J	55.2	J	0.8	=	1.9	=	52.8	J	38.8	=
7	SLA26740	SLA26740	861557	1065445	0.4	J	18.2	=	416	=	0.2	UJ	18.9	=	23.6	=	57.1	J	1.1	=	2.9	=	10.8	J	49.3	=
7	SLA89647	SLA89647	862081	1065038	0.4	UJ	2.5	=	70	J	0.2	U	12.7	J	0.6	U	17.1	=	0.2	U	0.9	=	9.3	U	20.5	J
8	SLA05745	SLA05745	862585	1065021	0.6	=	19.6	=	271	=	0.0	U	17.6	=	0.7	U	42.6	=	0.8	=	1.0	=	2.6	U	41.0	=
8	SLA05751	SLA05751	862488	1065062	0.6	U	15.1	=	235	=	0.0	U	21.9	=	0.2	U	27.9	=	1.1	=	0.4	=	2.5	U	43.5	=
8	SLA08100	SLA08100	862399	1065131	0.6	=	5.4	=	109	=	0.6	=	15.7	=	*	*	17.2	=	0.3	U	0.3	U	*	*	31.4	=
8	SLA25254	SLA25254	861700	1065462	0.6	J	8.8	J	130	=	0.0	U	17.8	=	0.3	UJ	13.1	J	4.0	=	0.2	U	29.8	J	33.3	=
8	SLA25259	SLA25259	861826	1065407	0.7	J	17.2	J	181	=	0.0	U	18.0	=	1.1	J	35.6	J	0.4	UJ	0.2	U	3.7	J	43.9	=
8	SLA75440	SLA75440	861184	1065642	0.3	U	7.1	=	125	=	0.3	U	16.3	=	0.8	U	12.4	=	0.6	=	0.5	=	29.5	=	25.6	=
8	SLA75441	SLA75441	861218	1065642	0.3	U	4.2	=	79	=	0.3	U	13.1	=	0.8	U	10.5	=	0.3	U	0.2	U	23.2	=	21.5	=
8	SLA75874	SLA75874	860906	1065654	0.3	U	10.9	=	147	=	0.3	U	18.9	=	0.0	U	24.4	=	1.4	U	0.2	U	0.2	U	37.6	=
8	SLA77808	SLA77808	860587	1065613	0.2	U	10.2	=	125	=	0.0	U	15.9	=	0.3	U	15.4	=	0.6	U	4.9	=	1.2	U	32.0	=
8	SLA77813	SLA77813	860505	1065584	0.3	U	12.2	=	191	=	0.2	U	16.3	=	0.4	U	21.2	=	0.3	U	5.8	=	1.2	U	33.7	=
8	SLA80453	SLA80453	860304	1065565	0.2	UJ	11.9	=	239	J	0.0	U	15.7	=	0.5	J	24.4	=	0.3	U	3.1	U	15.0	U	32.5	=
8	SLA83192	SLA83192	860115	1065515	0.2	U	2.3	=	142	=	0.0	U	14.3	=	0.2	=	12.7	=	1.3	=	1.3	U	63.6	U	19.3	=
8	SLA83201	SLA83201	860073	1065539	0.4	=	3.5	=	176	=	0.6	U	13.8	=	0.3	=	15.3	=	0.7	=	0.6	=	63.9	U	18.8	=
12	SLA79648	SLA79648[b]	859891	1065158	*	*	5.0	=	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	SLA81231	SLA81231	859941	1065148	0.4	=	29.3	=	144	=	0.2	=	16.2	=	1.5	=	0.1	=	0.2	=	1.6	=	8.4	U	30.2	=
12	SLA89593	SLA89593	862103	1065045	0.4	UJ	4.3	=	96	J	0.2	U	16.5	J	0.6	U	13.3	=	0.2	U	1.7	=	9.6	U	22.4	J
12	SLA86331	SLA86331	862463	1065017	0.0	U	0.1	=	2	=	0.0	U	0.2	=	0.0	U	0.2	=	0.0	U	0.0	=	0.2	U	0.3	=
12	SLA86701	SLA86701	860197	1065125	0.4	U	5.2	J	122	=	0.2	U	16.0	=	0.9	U	17.6	J	0.5	=	2.2	=	16.9	U	31.8	=
12	SLA86841	SLA86841	860148	1065148	0.5	=	0.2	U	208	=	0.2	UJ	0.2	UJ	0.9	U	17.9	J	0.2	U	0.7	U	17.7	U	24.6	=
12	SLA87083	SLA87083	860280	1065127	0.4	U	4.0	J	50	=	1.9	=	4.5	=	0.8	U	7.0	J	0.2	U	0.6	U	15.7	U	16.0	=

Table G-2-1. SLAPS Soil Metals Data

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
12	SLA87484	SLA87484	860333	1065117	0.4	U	7.6	J	145	=	0.2	U	17.3	=	0.9	U	15.3	J	1.1	=	1.9	=	17.5	U	27.0	=
12	SLA87960	SLA87960	860528	1065125	0.4	UJ	8.8	=	182	=	0.2	U	21.2	=	1.5	=	16.5	=	0.6	U	2.1	=	16.8	=	36.7	=
12	SLA91859	SLA91859	860986	1065098	0.4	U	14.5	=	207	=	0.2	U	19.2	=	0.6	U	30.8	=	0.2	U	8.2	=	9.9	U	40.9	=
12	SLA95743	SLA95743	861603	1065059	0.4	U	16.4	=	184	=	0.2	U	19.7	=	1.3	U	16.6	=	1.5	=	1.4	=	22.8	U	29.2	=

* Indicates that the sample was not analyzed for that COC.

[a] Biased samples. All other samples are randomly selected samples from the radiological systematic samples.

[b] Surface samples. All other samples are subsurface samples.

[c] The antimony and thallium results for samples SLA86708, SLA88763, SLA88764, SLA88765, and SLA88766 were averaged together when evaluating EPCs for the SLAPS. Although shown in the table, arsenic is not a soil COC at the SLAPS.

Notes:

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-2-2. Determination of Average Metals Concentrations in Soil at SLAPS Location SLA86708

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
3	SLA86708	SLA86708[a]	860245	1065208	50.1	=	221.0	=	155	=	167.0	J	85.9	J	0.9	U	19.5	J	85.0	=	115.0	=	16.9	U	22.5	=
3	SLA88763	SLA88763[a, b]	860245	1065208	0.2	UJ	4.6	=	*	*	*	*	*	*	*	*	*	*	*	*	1.5	=	*	*	*	*
3	SLA88764	SLA88764[a, b]	860249	1065210	0.2	UJ	1.7	=	*	*	*	*	*	*	*	*	*	*	*	*	1.4	=	*	*	*	*
3	SLA88765	SLA88765[a, b]	860242	1065212	0.2	UJ	6.4	=	*	*	*	*	*	*	*	*	*	*	*	*	1.7	=	*	*	*	*
3	SLA88766	SLA88766[a, b]	860243	1065204	0.2	UJ	1.2	=	*	*	*	*	*	*	*	*	*	*	*	*	0.7	=	*	*	*	*
3	SLA86708	SLA86708 AVG	NA	NA	10.2	=	47.0	=	155	=	167.0	J	85.9	J	0.9	U	19.5	J	85.0	=	24.1	=	16.9	U	22.5	=

* Indicates that the sample was not analyzed for that COC.

[a] The antimony and thallium results for samples SLA86708, SLA88763, SLA88764, SLA88765, and SLA88766 were averaged together when evaluating EPCs for the SLAPS. Although shown in the table, arsenic is not a soil COC at the SLAPS.

[b] Biased samples. All other samples are randomly selected samples from the radiological systematic samples.

Notes:

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-2-3. SLAPS Soil Metals Data with Location SLA86708 Averaged Concentrations

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
1, 11, CWC	SLA81208	SLA81208	859829	1065275	0.3	U	9.7	=	149	=	0.2	=	17.4	=	1.6	U	16.2	=	0.4	U	1.2	U	14.8	U	26.9	=
1, 11, CWC	SLA81218	SLA81218	859815	1065202	0.3	U	3.4	=	94	=	0.1	=	26.7	=	1.7	U	9.6	=	0.4	U	1.3	U	15.0	U	19.3	=
1, 11, CWC	SLA81403	SLA81403	859928	1065508	0.3	U	19.5	=	130	=	0.1	=	17.8	=	1.7	U	19.8	=	0.4	U	2.3	=	15.0	U	31.7	=
1, 11, CWC	SLA81384	SLA81384	859900	1065323	0.3	U	7.8	=	241	=	0.1	=	20.6	=	1.6	U	16.4	=	0.4	U	2.1	=	14.6	U	35.2	=
1, 11, CWC	SLA84300	SLA84300	860001	1065361	0.3	U	4.7	=	175	=	0.0	U	19.9	=	1.6	U	17.4	=	0.5	=	3.6	=	14.5	U	25.8	=
1, 11, CWC	SLA86333	SLA86333	859965	1065223	1.3	U	7.0	=	330	=	0.7	U	16.5	=	2.2	=	26.4	=	0.7	U	1.0	=	66.9	U	34.3	=
1, 11, CWC	SLA86528	SLA86528	859982	1065185	1.3	U	9.3	=	276	=	0.7	U	17.7	=	2.0	=	17.9	=	0.7	U	1.8	=	64.5	U	29.6	=
1, 11, CWC	SLA81381	SLA81381	859797	1065323	0.6	=	259.0	=	130	=	0.6	=	17.3	=	1.6	U	15.8	=	0.4	U	1.2	U	14.0	U	25.8	=
2	SLA77582	SLA77582	860702	1065572	0.5	J	7.9	=	113	=	0.2	=	12.7	=	4.3	=	17.6	=	0.6	U	2.6	J	6.1	=	28.5	=
2	SLA77667	SLA77667	860661	1065357	0.6	U	6.9	=	94	=	0.1	U	16.9	=	0.2	U	20.3	=	0.3	U	3.3	=	3.8	=	31.7	=
2	SLA78890	SLA78890	860614	1065565	0.2	J	8.9	=	128	=	0.0	U	16.6	=	0.4	=	22.3	=	0.3	U	2.5	=	14.4	=	27.9	=
2	SLA78904	SLA78904	860614	1065445	0.2	UJ	9.7	=	149	=	0.7	=	12.1	=	0.7	=	29.7	=	0.3	U	2.1	=	1.2	U	26.7	=
2	SLA79083	SLA79083	860425	1065475	0.4	UJ	2.2	=	112	=	0.4	U	12.6	=	0.4	U	21.5	=	0.3	U	0.5	U	8.3	=	20.4	=
2	SLA79089	SLA79089	860493	1065415	0.3	UJ	8.3	=	139	=	0.3	U	12.6	=	0.9	U	17.5	=	0.3	U	0.5	U	3.3	=	27.2	=
2	SLA80178	SLA80178	860545	1065326	0.2	UJ	12.2	=	140	=	0.4	U	21.2	=	0.1	U	28.0	=	0.3	U	3.6	U	1.2	U	38.5	=
2	SLA80190	SLA80190	860511	1065386	0.2	UJ	10.4	=	164	=	0.4	U	15.0	=	0.7	U	16.2	=	0.3	U	2.4	U	1.2	U	29.9	U
2	SLA80466	SLA80466	860253	1065415	0.4	U	4.5	J	57	=	0.2	U	18.6	=	0.9	U	15.4	J	0.9	=	1.7	=	18.0	U	27.1	=
2	SLA80467	SLA80467	860287	1065415	0.4	U	6.0	J	72	=	0.2	U	18.4	=	1.5	=	17.1	J	1.3	=	2.2	=	27.2	=	35.7	=
2	SLA80470	SLA80470	860321	1065415	0.4	U	8.0	J	91	=	0.2	U	16.6	=	1.1	=	15.3	J	1.0	=	2.6	=	17.5	U	27.9	=
2	SLA80471	SLA80471	860339	1065445	0.4	U	7.1	J	79	=	0.2	U	16.6	=	1.0	=	13.3	J	0.2	=	2.2	=	17.8	U	24.5	=
2	SLA83471	SLA83471	860146	1065435	0.2	U	0.2	U	202	=	0.0	U	14.9	=	0.1	U	17.2	=	0.6	=	0.5	U	15.4	U	20.7	=
2	SLA83479	SLA83479	860161	1065461	7.8	U	4.5	=	166	=	0.0	U	11.7	=	0.2	=	13.4	=	0.5	=	0.5	U	25.1	=	19.4	=
2	SLA83909	SLA83909	860115	1065317	0.2	UJ	3.7	=	126	=	0.0	U	14.9	=	0.4	=	18.2	=	0.3	U	0.5	U	5.8	=	26.2	=
2	SLA83925	SLA83925	860080	1065377	0.2	UJ	8.8	=	204	=	0.0	U	21.3	=	0.1	U	23.7	=	0.3	U	0.4	U	1.2	U	33.6	=
3	SLA81182	SLA81182	860127	1065213	0.4	U	10.2	J	524	=	0.2	U	18.2	=	0.9	U	20.2	J	0.4	=	2.6	=	17.8	U	27.7	=
3	SLA84991	SLA84991	860259	1065342	0.5	U	3.0	J	54	=	0.2	U	16.4	=	2.0	=	12.5	J	1.2	=	2.7	=	18.9	U	18.0	=
3	SLA84994	SLA84994	860311	1065312	0.4	U	7.1	J	129	=	0.2	U	18.3	=	0.9	U	16.5	J	1.5	=	2.3	=	17.8	U	27.3	=
3	SLA84998	SLA84998	860382	1065312	0.4	U	4.0	J	42	=	0.2	U	16.4	=	2.1	=	12.5	J	1.2	=	1.5	=	17.8	U	24.7	=
3	SLA85004	SLA85004	860276	1065373	0.4	U	23.3	J	1450	=	1.0	=	17.6	=	3.8	=	62.7	J	1.4	=	3.2	=	26.9	=	52.1	=
3	SLA85005	SLA85005	860311	1065373	0.4	U	9.5	J	96	=	0.2	U	16.7	=	1.3	=	19.1	J	1.9	=	2.6	=	17.5	U	33.2	=
3	SLA86527	SLA86527	860014	1065185	1.3	U	4.7	=	343	=	0.6	U	17.5	=	2.0	=	19.8	=	0.6	U	1.3	=	63.2	U	24.2	=
3	SLA86601	SLA86601	860163	1065294	0.4	U	2.1	J	87	=	0.2	U	17.9	=	0.9	U	15.1	J	0.9	=	1.5	=	17.8	U	18.8	=
3	SLA86607	SLA86607	860163	1065250	0.4	U	5.2	J	199	=	0.2	U	14.0	=	0.9	U	18.3	J	0.7	=	2.3	=	17.7	U	22.1	=
3	SLA86704	SLA86704	860197	1065180	1.5	=	0.4	=	80	=	9.7	J	42.4	J	0.9	U	14.1	J	0.5	=	0.7	U	18.6	U	18.0	=
3	SLA86708	SLA86708 AVG[a]	NA	NA	10.2	=	47.0	=	155	=	167	J	85.9	J	0.86	U	19.5	J	85	=	24.1	=	16.9	U	22.5	=
3	SLA87086	SLA87086	860280	1065180	0.4	U	9.0	J	293	=	0.2	U	16.5	=	3.3	=	16.0	J	1.2	=	2.5	=	17.1	U	26.5	=
3	SLA87495	SLA87495	860382	1065201	0.4	U	8.7	J	144	=	0.1	U	16.1	=	0.8	=	17.6	J	0.6	=	3.1	=	15.6	U	27.6	=
3	SLA87624	SLA87624	860397	1065256	0.4	U	15.8	J	843	=	0.2	U	21.3	=	0.9	U	31.9	J	0.6	=	4.0	=	17.5	U	75.3	=
3	SLA87634	SLA87634	860445	1065172	0.4	U	9.0	J	228	=	0.2	=	14.9	=	0.9	U	26.6	J	0.5	=	2.0	=	17.7	U	30.3	=
3	SLA87947	SLA87947	860512	1065270	0.4	UJ	2.6	=	69	=	0.2	U	17.0	=	0.6	U	11.9	=	0.2	U	1.0	=	8.8	U	20.9	=
3	SLA88774	SLA88774	860595	1065170	0.4	U	4.0	=	99	=	0.2	U	17.4	=	0.6	U	12.7	=	0.2	U	0.8	=	9.4	U	26.0	=
4	SLA07777	SLA07777	861341	1065541	0.3	U	26.9	=	115	=	0.8	U	15.2	=	1.4	U	19.2	=	1.3	U	1.4	=	4.6	U	32.4	=
4	SLA07783	SLA07783	861234	1065561	0.3	U	7.2	=	125	=	0.7	U	15.9	=	2.7	=	17.7	=	0.4	U	0.9	U	19.1	=	26.5	=

Table G-2-3. SLAPS Soil Metals Data with Location SLA86708 Averaged Concentrations

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
4	SLA07802	SLA07802	861195	1065492	0.3	UJ	4.7	=	209	J	0.5	=	13.0	=	5.9	=	17.8	=	1.3	=	0.4	U	3.4	U	22.3	=
4	SLA07809	SLA07809	861212	1065522	0.4	UJ	22.7	=	257	J	0.8	=	14.3	=	0.9	=	19.2	=	3.1	=	0.4	U	8.8	=	30.5	=
4	SLA07835	SLA07835	860760	1065566	0.4	J	7.0	=	173	J	0.5	=	15.1	=	0.7	=	15.7	=	0.3	U	0.4	U	3.6	U	28.6	=
4	SLA08032	SLA08032	861048	1065513	1.3	UJ	8.6	=	132	=	0.5	U	14.2	=	0.8	U	19.2	=	1.6	=	0.4	U	3.6	U	29.4	=
4	SLA08055	SLA08055	860970	1065486	0.7	UJ	5.7	=	206	=	0.5	U	14.5	=	1.1	U	17.8	=	1.4	=	0.4	U	3.6	U	27.2	=
4	SLA73388	SLA73388	860931	1065481	8.1	U	1.6	=	54	=	0.7	U	16.8	=	5.4	U	10.4	=	1.6	=	1.3	U	14.2	=	19.7	=
5	SLA27553	SLA27553	861536	1065438	1.0	U	12.7	=	160	=	0.5	=	17.2	=	5.6	=	24.9	=	0.3	=	0.0	U	16.6	U	35.5	=
5	SLA27561	SLA27561	861477	1065489	0.9	U	9.1	=	215	=	0.9	=	17.9	=	7.5	=	38.2	=	1.0	=	0.3	=	15.5	U	35.0	=
5	SLA65200	SLA65200	861402	1065341	0.3	UJ	3.6	=	228	=	0.2	=	10.4	=	0.7	=	18.1	=	0.3	U	0.4	=	6.6	U	22.4	=
5	SLA65210	SLA65210	861402	1065388	0.3	J	10.2	=	169	=	0.1	U	17.2	=	1.8	=	18.9	=	0.2	=	0.6	=	5.8	U	31.1	=
5	SLA65780	SLA65780	861372	1065377	0.3	UJ	9.4	=	162	=	0.3	=	13.0	=	2.2	=	22.2	=	0.2	=	1.3	U	5.9	U	28.5	=
5	SLA65789	SLA65789	861386	1065452	0.3	UJ	4.4	=	100	=	0.1	U	13.7	=	0.2	=	10.8	=	0.5	=	1.2	U	6.0	U	29.8	=
5	SLA66590	SLA66590	861614	1065266	0.3	UJ	3.2	=	50	=	0.4	=	8.7	=	0.2	U	9.8	=	1.3	=	0.3	U	3.0	U	16.6	=
5	SLA66600	SLA66600	861553	1065320	0.3	UJ	1.2	=	78	=	0.1	U	9.7	=	0.2	U	7.5	=	0.3	=	0.3	U	2.7	U	11.4	=
5	SLA70799	SLA70799	861232	1065453	0.5	U	9.6	=	128	=	0.1	U	12.3	=	0.9	U	15.7	=	1.3	=	2.4	=	3.1	U	28.1	=
5	SLA70811	SLA70811	861246	1065374	0.4	U	6.6	=	200	=	0.2	U	11.6	=	3.4	U	26.6	=	0.2	U	2.2	=	3.1	U	24.9	=
5	SLA71065	SLA71065	861190	1065436	0.3	J	7.6	=	157	=	0.6	U	13.1	=	2.1	=	13.9	=	3.6	=	1.1	U	59.1	U	27.2	=
5	SLA71080	SLA71080	861158	1065324	1.2	UJ	6.5	=	183	=	0.4	U	13.3	=	1.1	=	20.9	=	0.6	U	1.4	=	58.9	U	24.5	=
5	SLA72621	SLA72621	861045	1065472	7.6	UJ	6.8	=	70	=	0.6	U	12.1	=	5.1	U	11.3	=	5.0	=	0.7	U	63.5	U	25.1	=
5	SLA72640	SLA72640	861013	1065301	7.5	UJ	2.7	=	58	=	0.6	U	16.0	=	5.0	U	12.5	=	1.2	=	1.0	U	62.8	U	26.8	=
5	SLA73924	SLA73924	860911	1065317	0.3	U	2.6	=	35	=	0.6	U	16.5	=	5.1	U	9.5	=	1.1	=	1.4	=	8.9	U	23.9	=
5	SLA73940	SLA73940	860911	1065421	7.7	U	2.6	=	39	=	0.6	U	17.0	=	5.1	U	11.3	=	1.6	=	1.4	=	64.0	U	20.8	=
5	SLA74950	SLA74950	860813	1065304	0.3	U	9.1	=	322	=	0.3	U	17.8	=	0.7	U	19.9	=	1.2	J	0.2	U	9.8	U	39.5	=
5	SLA74955	SLA74955	860767	1065331	0.3	U	3.7	=	78	=	0.3	U	19.4	=	1.2	=	14.2	=	1.3	J	0.2	U	9.8	U	36.2	=
5	SLA88794	SLA88794	860695	1065213	0.4	U	12.1	J	106	=	0.2	U	22.5	=	0.6	U	10.8	=	0.5	=	2.5	=	9.4	U	33.9	=
5	SLA88828	SLA88828	860738	1065254	0.4	U	3.6	=	109	=	0.2	U	14.0	=	0.6	U	11.8	=	0.3	=	2.6	=	8.9	U	21.7	=
5	SLA89141	SLA89141	860762	1065168	0.3	U	6.1	=	196	=	0.5	U	14.6	=	0.9	=	24.7	=	0.2	U	1.9	=	7.4	U	26.0	=
5	SLA89432	SLA89432	860825	1065280	0.4	UJ	3.7	=	92	J	0.2	U	13.0	=	0.6	U	14.5	=	0.2	U	0.7	=	9.2	U	22.0	=
5	SLA89526	SLA89526	860916	1065213	0.4	UJ	5.6	=	74	J	0.2	U	12.7	J	0.6	U	10.1	=	0.2	U	0.9	=	9.5	U	22.1	J
5	SLA91732	SLA91732	860955	1065135	0.9	J	4.9	=	156	=	0.2	U	11.7	J	0.6	U	16.3	=	0.5	=	0.7	U	9.3	U	20.8	=
5	SLA91867	SLA91867	861021	1065219	0.4	U	24.8	=	260	=	0.2	U	16.0	=	2.5	=	23.9	=	0.2	U	7.2	=	9.2	U	34.9	=
5	SLA92516	SLA92516	861051	1065162	0.5	UJ	3.8	J	201	J	0.3	J	10.7	J	1.6	UJ	28.7	J	0.2	UJ	0.2	UJ	27.0	UJ	17.5	J
5	SLA92520	SLA92520	861084	1065105	0.5	UJ	4.5	J	144	J	0.2	UJ	11.3	J	1.6	UJ	17.3	J	0.2	UJ	0.2	UJ	27.4	UJ	20.7	J
5	SLA92861	SLA92861	861133	1065165	0.4	UJ	6.5	J	59	J	0.2	UJ	12.1	J	1.5	UJ	11.6	J	0.2	J	0.2	UJ	25.4	UJ	26.0	J
5	SLA92980	SLA92980	861158	1065271	0.4	U	10.9	=	64	=	0.2	U	12.0	=	1.5	U	12.2	=	1.1	U	1.3	U	25.3	U	26.6	=
5	SLA92985	SLA92985	861192	1065211	0.5	U	3.5	=	117	=	0.2	U	11.0	=	1.6	U	14.1	=	0.2	U	0.9	U	27.0	U	19.3	=
5	SLA93719	SLA93719	861228	1065259	0.4	U	2.8	=	69	=	0.2	U	13.0	=	1.6	U	11.0	=	1.6	=	0.9	=	26.6	U	21.1	=
5	SLA93726	SLA93726	861211	1065175	0.4	U	5.3	=	164	=	0.2	=	11.9	=	1.5	U	21.7	=	0.4	=	1.1	=	25.1	U	27.3	=
5	SLA94138	SLA94138	861289	1065279	0.4	U	8.6	=	270	=	0.2	U	14.0	=	2.6	=	13.3	=	1.3	=	1.6	=	26.5	U	23.6	=
5	SLA94148	SLA94148	861322	1065167	0.4	U	3.5	=	73	=	0.2	U	13.3	=	1.5	U	8.9	=	0.4	=	0.9	=	25.7	U	23.1	=
5	SLA94577	SLA94577	861372	1065233	0.4	U	4.1	=	162	=	0.2	U	10.1	=	1.5	U	23.8	=	0.2	U	1.0	=	24.9	U	23.4	=
5	SLA95111	SLA95111	861404	1065246	0.4	U	1.9	=	183	=	0.2	U	9.1	=	1.4	U	12.9	=	1.6	=	1.9	=	24.6	U	14.5	=
5	SLA95280	SLA95280	861436	1065133	0.4	U	6.6	=	137	=	0.2	U	13.5	=	1.7	=	20.9	=	0.3	=	1.9	=	23.5	U	23.1	=

Table G-2-3. SLAPS Soil Metals Data with Location SLA86708 Averaged Concentrations

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
5	SLA95466	SLA95466	861483	1065128	0.4	U	11.2	=	123	=	0.2	U	13.5	=	2.1	=	17.1	=	0.6	=	0.6	=	24.2	U	27.8	=
6	SLA26637	SLA26637	861834	1065187	0.5	J	7.1	=	108	=	0.0	U	16.1	=	0.5	J	18.6	=	0.3	J	1.5	=	14.8	J	24.1	=
6	SLA26640	SLA26640	861749	1065187	0.3	U	8.7	=	180	=	0.0	U	18.0	=	0.3	J	25.3	=	0.2	J	1.5	=	19.6	J	27.4	=
6	SLA89641	SLA89641	862019	1065060	0.4	UJ	3.8	=	89	J	0.2	U	11.9	J	0.6	U	13.8	=	0.2	U	1.0	=	9.2	U	22.2	J
6	SLA89666	SLA89666	861937	1065120	0.4	U	7.4	=	80	=	0.2	U	12.7	=	0.6	U	15.4	=	0.2	U	0.7	U	9.2	U	28.2	=
6	SLA89672	SLA89672	861965	1065070	0.4	U	21.2	=	98	=	0.2	U	12.4	=	0.7	=	18.4	=	0.2	U	0.7	U	9.2	U	29.2	=
6	SLA97113	SLA97113	861656	1065082	0.4	UJ	7.1	=	160	J	0.2	U	17.5	=	1.6	U	18.4	=	0.4	=	0.2	U	26.8	U	27.8	=
6	SLA97172	SLA97172	861675	1065161	0.4	UJ	5.5	=	139	J	0.2	U	15.6	=	1.5	U	16.7	=	0.2	U	0.2	U	25.5	U	21.7	=
6	SLA97178	SLA97178	861641	1065103	0.4	UJ	10.3	=	77	J	0.2	=	13.6	=	1.5	U	16.1	=	0.2	U	0.2	U	25.3	U	21.4	=
6	SLA97180	SLA97180	861709	1065103	0.4	UJ	1.5	=	65	J	0.2	U	10.7	=	1.5	U	7.6	=	0.2	U	0.2	U	25.6	U	14.8	=
6	SLA98235	SLA98235	861917	1065110	0.4	UJ	3.1	=	73	J	0.2	U	13.9	=	1.5	U	12.1	=	0.2	U	0.2	U	26.2	U	23.4	=
7	SLA05267	SLA05267	862336	1065119	4.4	U	4.7	=	102	=	0.5	U	14.8	=	0.9	U	23.3	=	0.3	U	1.1	J	16.5	U	22.5	=
7	SLA05281	SLA05281	862210	1065182	4.4	U	7.0	=	123	=	0.5	U	14.1	=	0.9	U	19.9	=	0.5	J	1.1	J	16.3	U	24.1	=
7	SLA05293	SLA05293	862095	1065189	4.2	U	8.3	=	194	=	0.5	U	13.4	=	1.3	J	24.7	=	0.3	U	1.8	U	15.6	U	27.0	=
7	SLA05304	SLA05304	862046	1065248	22.9	U	16.4	=	232	=	2.4	U	19.5	=	4.5	U	41.1	=	0.3	U	2.3	U	84.7	U	37.6	=
7	SLA05314	SLA05314	861983	1065280	22.4	U	17.7	=	309	=	2.4	U	21.9	=	4.4	U	65.3	=	0.3	U	3.5	=	82.9	U	45.5	=
7	SLA05324	SLA05324	861920	1065311	5.1	U	8.4	=	138	=	0.5	U	16.1	=	1.4	J	22.7	=	0.5	J	1.6	U	18.7	U	27.1	=
7	SLA06123	SLA06123	862186	1065084	0.3	U	4.9	=	79	=	0.0	U	14.3	=	0.4	=	18.7	=	0.4	U	0.3	U	2.5	U	22.0	=
7	SLA06159	SLA06159	862032	1065143	0.4	U	8.2	=	146	=	0.5	U	16.5	=	1.0	U	20.1	=	1.0	U	0.1	U	1.8	U	26.1	=
7	SLA06162	SLA06162	862077	1065106	0.3	U	6.3	U	65	=	0.0	U	12.0	=	0.5	U	11.7	=	0.5	U	0.2	U	1.8	U	21.9	=
7	SLA25846	SLA25846	861768	1065326	0.7	J	12.2	=	360	=	0.4	UJ	18.3	=	0.6	UJ	51.8	=	0.5	UJ	0.4	J	49.4	J	37.9	=
7	SLA25856	SLA25856	861768	1065379	0.7	J	16.3	=	218	=	0.6	U	17.0	=	0.7	UJ	29.0	=	0.8	U	0.4	J	23.6	J	40.5	=
7	SLA26734	SLA26734	861687	1065389	0.5	J	11.2	=	626	=	0.3	UJ	18.5	=	3.0	J	55.2	J	0.8	=	1.9	=	52.8	J	38.8	=
7	SLA26740	SLA26740	861557	1065445	0.4	J	18.2	=	416	=	0.2	UJ	18.9	=	23.6	=	57.1	J	1.1	=	2.9	=	10.8	J	49.3	=
7	SLA89647	SLA89647	862081	1065038	0.4	UJ	2.5	=	70	J	0.2	U	12.7	J	0.6	U	17.1	=	0.2	U	0.9	=	9.3	U	20.5	J
8	SLA05745	SLA05745	862585	1065021	0.6	=	19.6	=	271	=	0.0	U	17.6	=	0.7	U	42.6	=	0.8	=	1.0	=	2.6	U	41.0	=
8	SLA05751	SLA05751	862488	1065062	0.6	U	15.1	=	235	=	0.0	U	21.9	=	0.2	U	27.9	=	1.1	=	0.4	=	2.5	U	43.5	=
8	SLA08100	SLA08100	862399	1065131	0.6	=	5.4	=	109	=	0.6	=	15.7	=	*	*	17.2	=	0.3	U	0.3	U	*	*	31.4	=
8	SLA25254	SLA25254	861700	1065462	0.6	J	8.8	J	130	=	0.0	U	17.8	=	0.3	UJ	13.1	J	4.0	=	0.2	U	29.8	J	33.3	=
8	SLA25259	SLA25259	861826	1065407	0.7	J	17.2	J	181	=	0.0	U	18.0	=	1.1	J	35.6	J	0.4	UJ	0.2	U	3.7	J	43.9	=
8	SLA75440	SLA75440	861184	1065642	0.3	U	7.1	=	125	=	0.3	U	16.3	=	0.8	U	12.4	=	0.6	=	0.5	=	29.5	=	25.6	=
8	SLA75441	SLA75441	861218	1065642	0.3	U	4.2	=	79	=	0.3	U	13.1	=	0.8	U	10.5	=	0.3	U	0.2	U	23.2	=	21.5	=
8	SLA75874	SLA75874	860906	1065654	0.3	U	10.9	=	147	=	0.3	U	18.9	=	0.0	U	24.4	=	1.4	U	0.2	U	0.2	U	37.6	=
8	SLA77808	SLA77808	860587	1065613	0.2	U	10.2	=	125	=	0.0	U	15.9	=	0.3	U	15.4	=	0.6	U	4.9	=	1.2	U	32.0	=
8	SLA77813	SLA77813	860505	1065584	0.3	U	12.2	=	191	=	0.2	U	16.3	=	0.4	U	21.2	=	0.3	U	5.8	=	1.2	U	33.7	=
8	SLA80453	SLA80453	860304	1065565	0.2	UJ	11.9	=	239	J	0.0	U	15.7	=	0.5	J	24.4	=	0.3	U	3.1	U	15.0	U	32.5	=
8	SLA83192	SLA83192	860115	1065515	0.2	U	2.3	=	142	=	0.0	U	14.3	=	0.2	=	12.7	=	1.3	=	1.3	U	63.6	U	19.3	=
8	SLA83201	SLA83201	860073	1065539	0.4	=	3.5	=	176	=	0.6	U	13.8	=	0.3	=	15.3	=	0.7	=	0.6	=	63.9	U	18.8	=
12	SLA79648	SLA79648[b]	859891	1065158	*	*	5.0	=	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	SLA81231	SLA81231	859941	1065148	0.4	=	29.3	=	144	=	0.2	=	16.2	=	1.5	=	0.1	=	0.2	=	1.6	=	8.4	U	30.2	=
12	SLA89593	SLA89593	862103	1065045	0.4	UJ	4.3	=	96	J	0.2	U	16.5	J	0.6	U	13.3	=	0.2	U	1.7	=	9.6	U	22.4	J
12	SLA86331	SLA86331	862463	1065017	0.0	U	0.1	=	2	=	0.0	U	0.2	=	0.0	U	0.2	=	0.0	U	0.0	=	0.2	U	0.3	=
12	SLA86701	SLA86701	860197	1065125	0.4	U	5.2	J	122	=	0.2	U	16.0	=	0.9	U	17.6	J	0.5	=	2.2	=	16.9	U	31.8	=

Table G-2-3. SLAPS Soil Metals Data with Location SLA86708 Averaged Concentrations

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
12	SLA86841	SLA86841	860148	1065148	0.5	=	0.2	U	208	=	0.2	UJ	0.2	UJ	0.9	U	17.9	J	0.2	U	0.7	U	17.7	U	24.6	=
12	SLA87083	SLA87083	860280	1065127	0.4	U	4.0	J	50	=	1.9	=	4.5	=	0.8	U	7.0	J	0.2	U	0.6	U	15.7	U	16.0	=
12	SLA87484	SLA87484	860333	1065117	0.4	U	7.6	J	145	=	0.2	U	17.3	=	0.9	U	15.3	J	1.1	=	1.9	=	17.5	U	27.0	=
12	SLA87960	SLA87960	860528	1065125	0.4	UJ	8.8	=	182	=	0.2	U	21.2	=	1.5	=	16.5	=	0.6	U	2.1	=	16.8	=	36.7	=
12	SLA91859	SLA91859	860986	1065098	0.4	U	14.5	=	207	=	0.2	U	19.2	=	0.6	U	30.8	=	0.2	U	8.2	=	9.9	U	40.9	=
12	SLA95743	SLA95743	861603	1065059	0.4	U	16.4	=	184	=	0.2	U	19.7	=	1.3	U	16.6	=	1.5	=	1.4	=	22.8	U	29.2	=

* Indicates that the sample was not analyzed for that COC.

[a] The antimony and thallium results for samples SLA86708, SLA88763, SLA88764, SLA88765, and SLA88766 were averaged together when evaluating EPCs for the SLAPS. Although shown in the table, arsenic is not a soil COC at the SLAPS.

[b] Surface samples. All other samples are subsurface samples.

Notes:

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-2-4. SLAPS Soil Metals Data with Half Detection Limits

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
1, 11, CWC	SLA81208	SLA81208	859829	1065275	0.1	U	9.7	=	149	=	0.2	=	17.4	=	0.8	U	16.2	=	0.2	U	0.6	U	7.4	U	26.9	=
1, 11, CWC	SLA81218	SLA81218	859815	1065202	0.1	U	3.4	=	94	=	0.1	=	26.7	=	0.9	U	9.6	=	0.2	U	0.7	U	7.5	U	19.3	=
1, 11, CWC	SLA81403	SLA81403	859928	1065508	0.1	U	19.5	=	130	=	0.1	=	17.8	=	0.9	U	19.8	=	0.2	U	2.3	=	7.5	U	31.7	=
1, 11, CWC	SLA81384	SLA81384	859900	1065323	0.1	U	7.8	=	241	=	0.1	=	20.6	=	0.8	U	16.4	=	0.2	U	2.1	=	7.3	U	35.2	=
1, 11, CWC	SLA84300	SLA84300	860001	1065361	0.1	U	4.7	=	175	=	0.0	U	19.9	=	0.8	U	17.4	=	0.5	=	3.6	=	7.3	U	25.8	=
1, 11, CWC	SLA86333	SLA86333	859965	1065223	0.7	U	7.0	=	330	=	0.3	U	16.5	=	2.2	=	26.4	=	0.3	U	1.0	=	33.5	U	34.3	=
1, 11, CWC	SLA86528	SLA86528	859982	1065185	0.7	U	9.3	=	276	=	0.3	U	17.7	=	2.0	=	17.9	=	0.3	U	1.8	=	32.3	U	29.6	=
1, 11, CWC	SLA81381	SLA81381	859797	1065323	0.6	=	259.0	=	130	=	0.6	=	17.3	=	0.8	U	15.8	=	0.2	U	0.6	U	7.0	U	25.8	=
2	SLA77582	SLA77582	860702	1065572	0.5	J	7.9	=	113	=	0.2	=	12.7	=	4.3	=	17.6	=	0.3	U	2.6	J	6.1	=	28.5	=
2	SLA77667	SLA77667	860661	1065357	0.3	U	6.9	=	94	=	0.1	U	16.9	=	0.1	U	20.3	=	0.1	U	3.3	=	3.8	=	31.7	=
2	SLA78890	SLA78890	860614	1065565	0.2	J	8.9	=	128	=	0.0	U	16.6	=	0.4	=	22.3	=	0.1	U	2.5	=	14.4	=	27.9	=
2	SLA78904	SLA78904	860614	1065445	0.1	UJ	9.7	=	149	=	0.7	=	12.1	=	0.7	=	29.7	=	0.1	U	2.1	=	0.6	U	26.7	=
2	SLA79083	SLA79083	860425	1065475	0.2	UJ	2.2	=	112	=	0.2	U	12.6	=	0.2	U	21.5	=	0.1	U	0.2	U	8.3	=	20.4	=
2	SLA79089	SLA79089	860493	1065415	0.2	UJ	8.3	=	139	=	0.1	U	12.6	=	0.4	U	17.5	=	0.1	U	0.2	U	3.3	=	27.2	=
2	SLA80178	SLA80178	860545	1065326	0.1	UJ	12.2	=	140	=	0.2	U	21.2	=	0.1	U	28.0	=	0.1	U	1.8	U	0.6	U	38.5	=
2	SLA80190	SLA80190	860511	1065386	0.1	UJ	10.4	=	164	=	0.2	U	15.0	=	0.4	U	16.2	=	0.1	U	1.2	U	0.6	U	15.0	U
2	SLA80466	SLA80466	860253	1065415	0.2	U	4.5	J	57	=	0.1	U	18.6	=	0.5	U	15.4	J	0.9	=	1.7	=	9.0	U	27.1	=
2	SLA80467	SLA80467	860287	1065415	0.2	U	6.0	J	72	=	0.1	U	18.4	=	1.5	=	17.1	J	1.3	=	2.2	=	27.2	=	35.7	=
2	SLA80470	SLA80470	860321	1065415	0.2	U	8.0	J	91	=	0.1	U	16.6	=	1.1	=	15.3	J	1.0	=	2.6	=	8.8	U	27.9	=
2	SLA80471	SLA80471	860339	1065445	0.2	U	7.1	J	79	=	0.1	U	16.6	=	1.0	=	13.3	J	0.2	=	2.2	=	8.9	U	24.5	=
2	SLA83471	SLA83471	860146	1065435	0.1	U	0.1	U	202	=	0.0	U	14.9	=	0.1	U	17.2	=	0.6	=	0.2	U	7.7	U	20.7	=
2	SLA83479	SLA83479	860161	1065461	3.9	U	4.5	=	166	=	0.0	U	11.7	=	0.2	=	13.4	=	0.5	=	0.2	U	25.1	=	19.4	=
2	SLA83909	SLA83909	860115	1065317	0.1	UJ	3.7	=	126	=	0.0	U	14.9	=	0.4	=	18.2	=	0.1	U	0.2	U	5.8	=	26.2	=
2	SLA83925	SLA83925	860080	1065377	0.1	UJ	8.8	=	204	=	0.0	U	21.3	=	0.1	U	23.7	=	0.1	U	0.2	U	0.6	U	33.6	=
3	SLA81182	SLA81182	860127	1065213	0.2	U	10.2	J	524	=	0.1	U	18.2	=	0.5	U	20.2	J	0.4	=	2.6	=	8.9	U	27.7	=
3	SLA84991	SLA84991	860259	1065342	0.2	U	3.0	J	54	=	0.1	U	16.4	=	2.0	=	12.5	J	1.2	=	2.7	=	9.5	U	18.0	=
3	SLA84994	SLA84994	860311	1065312	0.2	U	7.1	J	129	=	0.1	U	18.3	=	0.5	U	16.5	J	1.5	=	2.3	=	8.9	U	27.3	=
3	SLA84998	SLA84998	860382	1065312	0.2	U	4.0	J	42	=	0.1	U	16.4	=	2.1	=	12.5	J	1.2	=	1.5	=	8.9	U	24.7	=
3	SLA85004	SLA85004	860276	1065373	0.2	U	23.3	J	1450	=	1.0	=	17.6	=	3.8	=	62.7	J	1.4	=	3.2	=	26.9	=	52.1	=
3	SLA85005	SLA85005	860311	1065373	0.2	U	9.5	J	96	=	0.1	U	16.7	=	1.3	=	19.1	J	1.9	=	2.6	=	8.8	U	33.2	=
3	SLA86527	SLA86527	860014	1065185	0.7	U	4.7	=	343	=	0.3	U	17.5	=	2.0	=	19.8	=	0.3	U	1.3	=	31.6	U	24.2	=
3	SLA86601	SLA86601	860163	1065294	0.2	U	2.1	J	87	=	0.1	U	17.9	=	0.5	U	15.1	J	0.9	=	1.5	=	8.9	U	18.8	=
3	SLA86607	SLA86607	860163	1065250	0.2	U	5.2	J	199	=	0.1	U	14.0	=	0.5	U	18.3	J	0.7	=	2.3	=	8.9	U	22.1	=
3	SLA86704	SLA86704	860197	1065180	1.5	=	0.4	=	80	=	9.7	J	42.4	J	0.5	U	14.1	J	0.5	=	0.4	U	9.3	U	18.0	=
3	SLA86708	SLA86708 AVG[a]	NA	NA	10.2	=	47.0	=	155	=	167	J	85.9	J	0.43	U	19.5	J	85	=	24.1	=	8.45	U	22.5	=
3	SLA87086	SLA87086	860280	1065180	0.2	U	9.0	J	293	=	0.1	U	16.5	=	3.3	=	16.0	J	1.2	=	2.5	=	8.6	U	26.5	=
3	SLA87495	SLA87495	860382	1065201	0.2	U	8.7	J	144	=	0.1	U	16.1	=	0.8	=	17.6	J	0.6	=	3.1	=	7.8	U	27.6	=
3	SLA87624	SLA87624	860397	1065256	0.2	U	15.8	J	843	=	0.1	U	21.3	=	0.4	U	31.9	J	0.6	=	4.0	=	8.8	U	75.3	=
3	SLA87634	SLA87634	860445	1065172	0.2	U	9.0	J	228	=	0.2	=	14.9	=	0.5	U	26.6	J	0.5	=	2.0	=	8.9	U	30.3	=
3	SLA87947	SLA87947	860512	1065270	0.2	UJ	2.6	=	69	=	0.1	U	17.0	=	0.3	U	11.9	=	0.1	U	1.0	=	4.4	U	20.9	=
3	SLA88774	SLA88774	860595	1065170	0.2	U	4.0	=	99	=	0.1	U	17.4	=	0.3	U	12.7	=	0.1	U	0.8	=	4.7	U	26.0	=
4	SLA07777	SLA07777	861341	1065541	0.2	U	26.9	=	115	=	0.4	U	15.2	=	0.7	U	19.2	=	0.7	U	1.4	=	2.3	U	32.4	=
4	SLA07783	SLA07783	861234	1065561	0.2	U	7.2	=	125	=	0.3	U	15.9	=	2.7	=	17.7	=	0.2	U	0.5	U	19.1	=	26.5	=
4	SLA07802	SLA07802	861195	1065492	0.2	UJ	4.7	=	209	J	0.5	=	13.0	=	5.9	=	17.8	=	1.3	=	0.2	U	1.7	U	22.3	=
4	SLA07809	SLA07809	861212	1065522	0.2	UJ	22.7	=	257	J	0.8	=	14.3	=	0.9	=	19.2	=	3.1	=	0.2	U	8.8	=	30.5	=
4	SLA07835	SLA07835	860760	1065566	0.4	J	7.0	=	173	J	0.5	=	15.1	=	0.7	=	15.7	=	0.1	U	0.2	U	1.8	U	28.6	=
4	SLA08032	SLA08032	861048	1065513	0.7	UJ	8.6	=	132	=	0.3	U	14.2	=	0.4	U	19.2	=	1.6	=	0.2	U	1.8	U	29.4	=

Table G-2-4. SLAPS Soil Metals Data with Half Detection Limits

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
4	SLA08055	SLA08055	860970	1065486	0.3	UJ	5.7	=	206	=	0.3	U	14.5	=	0.6	U	17.8	=	1.4	=	0.2	U	1.8	U	27.2	=
4	SLA73388	SLA73388	860931	1065481	4.1	U	1.6	=	54	=	0.3	U	16.8	=	2.7	U	10.4	=	1.6	=	0.7	U	14.2	=	19.7	=
5	SLA27553	SLA27553	861536	1065438	0.5	U	12.7	=	160	=	0.5	=	17.2	=	5.6	=	24.9	=	0.3	=	0.0	U	8.3	U	35.5	=
5	SLA27561	SLA27561	861477	1065489	0.5	U	9.1	=	215	=	0.9	=	17.9	=	7.5	=	38.2	=	1.0	=	0.3	=	7.8	U	35.0	=
5	SLA65200	SLA65200	861402	1065341	0.2	UJ	3.6	=	228	=	0.2	=	10.4	=	0.7	=	18.1	=	0.1	U	0.4	=	3.3	U	22.4	=
5	SLA65210	SLA65210	861402	1065388	0.3	J	10.2	=	169	=	0.0	U	17.2	=	1.8	=	18.9	=	0.2	=	0.6	=	2.9	U	31.1	=
5	SLA65780	SLA65780	861372	1065377	0.1	UJ	9.4	=	162	=	0.3	=	13.0	=	2.2	=	22.2	=	0.2	=	0.7	U	3.0	U	28.5	=
5	SLA65789	SLA65789	861386	1065452	0.1	UJ	4.4	=	100	=	0.0	U	13.7	=	0.2	=	10.8	=	0.5	=	0.6	U	3.0	U	29.8	=
5	SLA66590	SLA66590	861614	1065266	0.2	UJ	3.2	=	50	=	0.4	=	8.7	=	0.1	U	9.8	=	1.3	=	0.2	U	1.5	U	16.6	=
5	SLA66600	SLA66600	861553	1065320	0.1	UJ	1.2	=	78	=	0.0	U	9.7	=	0.1	U	7.5	=	0.3	=	0.2	U	1.4	U	11.4	=
5	SLA70799	SLA70799	861232	1065453	0.2	U	9.6	=	128	=	0.1	U	12.3	=	0.5	U	15.7	=	1.3	=	2.4	=	1.6	U	28.1	=
5	SLA70811	SLA70811	861246	1065374	0.2	U	6.6	=	200	=	0.1	U	11.6	=	1.7	U	26.6	=	0.1	U	2.2	=	1.6	U	24.9	=
5	SLA71065	SLA71065	861190	1065436	0.3	J	7.6	=	157	=	0.3	U	13.1	=	2.1	=	13.9	=	3.6	=	0.6	U	29.6	U	27.2	=
5	SLA71080	SLA71080	861158	1065324	0.6	UJ	6.5	=	183	=	0.2	U	13.3	=	1.1	=	20.9	=	0.3	U	1.4	=	29.5	U	24.5	=
5	SLA72621	SLA72621	861045	1065472	3.8	UJ	6.8	=	70	=	0.3	U	12.1	=	2.6	U	11.3	=	5.0	=	0.3	U	31.8	U	25.1	=
5	SLA72640	SLA72640	861013	1065301	3.8	UJ	2.7	=	58	=	0.3	U	16.0	=	2.5	U	12.5	=	1.2	=	0.5	U	31.4	U	26.8	=
5	SLA73924	SLA73924	860911	1065317	0.2	U	2.6	=	35	=	0.3	U	16.5	=	2.6	U	9.5	=	1.1	=	1.4	=	4.5	U	23.9	=
5	SLA73940	SLA73940	860911	1065421	3.9	U	2.6	=	39	=	0.3	U	17.0	=	2.6	U	11.3	=	1.6	=	1.4	=	32.0	U	20.8	=
5	SLA74950	SLA74950	860813	1065304	0.1	U	9.1	=	322	=	0.2	U	17.8	=	0.4	U	19.9	=	1.2	J	0.1	U	4.9	U	39.5	=
5	SLA74955	SLA74955	860767	1065331	0.1	U	3.7	=	78	=	0.2	U	19.4	=	1.2	=	14.2	=	1.3	J	0.1	U	4.9	U	36.2	=
5	SLA88794	SLA88794	860695	1065213	0.2	U	12.1	J	106	=	0.1	U	22.5	=	0.3	U	10.8	=	0.5	=	2.5	=	4.7	U	33.9	=
5	SLA88828	SLA88828	860738	1065254	0.2	U	3.6	=	109	=	0.1	U	14.0	=	0.3	U	11.8	=	0.3	=	2.6	=	4.5	U	21.7	=
5	SLA89141	SLA89141	860762	1065168	0.2	U	6.1	=	196	=	0.3	U	14.6	=	0.9	=	24.7	=	0.1	U	1.9	=	3.7	U	26.0	=
5	SLA89432	SLA89432	860825	1065280	0.2	UJ	3.7	=	92	J	0.1	U	13.0	=	0.3	U	14.5	=	0.1	U	0.7	=	4.6	U	22.0	=
5	SLA89526	SLA89526	860916	1065213	0.2	UJ	5.6	=	74	J	0.1	U	12.7	J	0.3	U	10.1	=	0.1	U	0.9	=	4.8	U	22.1	J
5	SLA91732	SLA91732	860955	1065135	0.9	J	4.9	=	156	=	0.1	U	11.7	J	0.3	U	16.3	=	0.5	=	0.3	U	4.7	U	20.8	=
5	SLA91867	SLA91867	861021	1065219	0.2	U	24.8	=	260	=	0.1	U	16.0	=	2.5	=	23.9	=	0.1	U	7.2	=	4.6	U	34.9	=
5	SLA92516	SLA92516	861051	1065162	0.2	UJ	3.8	J	201	J	0.3	J	10.7	J	0.8	UJ	28.7	J	0.1	UJ	0.1	UJ	13.5	UJ	17.5	J
5	SLA92520	SLA92520	861084	1065105	0.2	UJ	4.5	J	144	J	0.1	UJ	11.3	J	0.8	UJ	17.3	J	0.1	UJ	0.1	UJ	13.7	UJ	20.7	J
5	SLA92861	SLA92861	861133	1065165	0.2	UJ	6.5	J	59	J	0.1	UJ	12.1	J	0.8	UJ	11.6	J	0.2	J	0.1	UJ	12.7	UJ	26.0	J
5	SLA92980	SLA92980	861158	1065271	0.2	U	10.9	=	64	=	0.1	U	12.0	=	0.8	U	12.2	=	0.6	U	0.7	U	12.7	U	26.6	=
5	SLA92985	SLA92985	861192	1065211	0.2	U	3.5	=	117	=	0.1	U	11.0	=	0.8	U	14.1	=	0.1	U	0.4	U	13.5	U	19.3	=
5	SLA93719	SLA93719	861228	1065259	0.2	U	2.8	=	69	=	0.1	U	13.0	=	0.8	U	11.0	=	1.6	=	0.9	=	13.3	U	21.1	=
5	SLA93726	SLA93726	861211	1065175	0.2	U	5.3	=	164	=	0.2	=	11.9	=	0.8	U	21.7	=	0.4	=	1.1	=	12.6	U	27.3	=
5	SLA94138	SLA94138	861289	1065279	0.2	U	8.6	=	270	=	0.1	U	14.0	=	2.6	=	13.3	=	1.3	=	1.6	=	13.3	U	23.6	=
5	SLA94148	SLA94148	861322	1065167	0.2	U	3.5	=	73	=	0.1	U	13.3	=	0.8	U	8.9	=	0.4	=	0.9	=	12.9	U	23.1	=
5	SLA94577	SLA94577	861372	1065233	0.2	U	4.1	=	162	=	0.1	U	10.1	=	0.8	U	23.8	=	0.1	U	1.0	=	12.5	U	23.4	=
5	SLA95111	SLA95111	861404	1065246	0.2	U	1.9	=	183	=	0.1	U	9.1	=	0.7	U	12.9	=	1.6	=	1.9	=	12.3	U	14.5	=
5	SLA95280	SLA95280	861436	1065133	0.2	U	6.6	=	137	=	0.1	U	13.5	=	1.7	=	20.9	=	0.3	=	1.9	=	11.8	U	23.1	=
5	SLA95466	SLA95466	861483	1065128	0.2	U	11.2	=	123	=	0.1	U	13.5	=	2.1	=	17.1	=	0.6	=	0.6	=	12.1	U	27.8	=
6	SLA26637	SLA26637	861834	1065187	0.5	J	7.1	=	108	=	0.0	U	16.1	=	0.5	J	18.6	=	0.3	J	1.5	=	14.8	J	24.1	=
6	SLA26640	SLA26640	861749	1065187	0.2	U	8.7	=	180	=	0.0	U	18.0	=	0.3	J	25.3	=	0.2	J	1.5	=	19.6	J	27.4	=
6	SLA89641	SLA89641	862019	1065060	0.2	UJ	3.8	=	89	J	0.1	U	11.9	J	0.3	U	13.8	=	0.1	U	1.0	=	4.6	U	22.2	J
6	SLA89666	SLA89666	861937	1065120	0.2	U	7.4	=	80	=	0.1	U	12.7	=	0.3	U	15.4	=	0.1	U	0.3	U	4.6	U	28.2	=
6	SLA89672	SLA89672	861965	1065070	0.2	U	21.2	=	98	=	0.1	U	12.4	=	0.7	=	18.4	=	0.1	U	0.3	U	4.6	U	29.2	=
6	SLA97113	SLA97113	861656	1065082	0.2	UJ	7.1	=	160	J	0.1	U	17.5	=	0.8	U	18.4	=	0.4	=	0.1	U	13.4	U	27.8	=

Table G-2-4. SLAPS Soil Metals Data with Half Detection Limits

IA	Station ID	Sample ID	Easting	Northing	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
					Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
6	SLA97172	SLA97172	861675	1065161	0.2	UJ	5.5	=	139	J	0.1	U	15.6	=	0.8	U	16.7	=	0.1	U	0.1	U	12.8	U	21.7	=
6	SLA97178	SLA97178	861641	1065103	0.2	UJ	10.3	=	77	J	0.2	=	13.6	=	0.8	U	16.1	=	0.1	U	0.1	U	12.7	U	21.4	=
6	SLA97180	SLA97180	861709	1065103	0.2	UJ	1.5	=	65	J	0.1	U	10.7	=	0.8	U	7.6	=	0.1	U	0.1	U	12.8	U	14.8	=
6	SLA98235	SLA98235	861917	1065110	0.2	UJ	3.1	=	73	J	0.1	U	13.9	=	0.8	U	12.1	=	0.1	U	0.1	U	13.1	U	23.4	=
7	SLA05267	SLA05267	862336	1065119	2.2	U	4.7	=	102	=	0.2	U	14.8	=	0.4	U	23.3	=	0.1	U	1.1	J	8.3	U	22.5	=
7	SLA05281	SLA05281	862210	1065182	2.2	U	7.0	=	123	=	0.2	U	14.1	=	0.4	U	19.9	=	0.5	J	1.1	J	8.2	U	24.1	=
7	SLA05293	SLA05293	862095	1065189	2.1	U	8.3	=	194	=	0.2	U	13.4	=	1.3	J	24.7	=	0.1	U	0.9	U	7.8	U	27.0	=
7	SLA05304	SLA05304	862046	1065248	11.5	U	16.4	=	232	=	1.2	U	19.5	=	2.3	U	41.1	=	0.2	U	1.2	U	42.4	U	37.6	=
7	SLA05314	SLA05314	861983	1065280	11.2	U	17.7	=	309	=	1.2	U	21.9	=	2.2	U	65.3	=	0.2	U	3.5	=	41.5	U	45.5	=
7	SLA05324	SLA05324	861920	1065311	2.6	U	8.4	=	138	=	0.3	U	16.1	=	1.4	J	22.7	=	0.5	J	0.8	U	9.4	U	27.1	=
7	SLA06123	SLA06123	862186	1065084	0.2	U	4.9	=	79	=	0.0	U	14.3	=	0.4	=	18.7	=	0.2	U	0.2	U	1.3	U	22.0	=
7	SLA06159	SLA06159	862032	1065143	0.2	U	8.2	=	146	=	0.3	U	16.5	=	0.5	U	20.1	=	0.5	U	0.1	U	0.9	U	26.1	=
7	SLA06162	SLA06162	862077	1065106	0.1	U	3.2	U	65	=	0.0	U	12.0	=	0.2	U	11.7	=	0.2	U	0.1	U	0.9	U	21.9	=
7	SLA25846	SLA25846	861768	1065326	0.7	J	12.2	=	360	=	0.2	UJ	18.3	=	0.3	UJ	51.8	=	0.3	UJ	0.4	J	49.4	J	37.9	=
7	SLA25856	SLA25856	861768	1065379	0.7	J	16.3	=	218	=	0.3	U	17.0	=	0.3	UJ	29.0	=	0.4	U	0.4	J	23.6	J	40.5	=
7	SLA26734	SLA26734	861687	1065389	0.5	J	11.2	=	626	=	0.1	UJ	18.5	=	3.0	J	55.2	J	0.8	=	1.9	=	52.8	J	38.8	=
7	SLA26740	SLA26740	861557	1065445	0.4	J	18.2	=	416	=	0.1	UJ	18.9	=	23.6	=	57.1	J	1.1	=	2.9	=	10.8	J	49.3	=
7	SLA89647	SLA89647	862081	1065038	0.2	UJ	2.5	=	70	J	0.1	U	12.7	J	0.3	U	17.1	=	0.1	U	0.9	=	4.7	U	20.5	J
8	SLA05745	SLA05745	862585	1065021	0.6	=	19.6	=	271	=	0.0	U	17.6	=	0.4	U	42.6	=	0.8	=	1.0	=	1.3	U	41.0	=
8	SLA05751	SLA05751	862488	1065062	0.3	U	15.1	=	235	=	0.0	U	21.9	=	0.1	U	27.9	=	1.1	=	0.4	=	1.3	U	43.5	=
8	SLA08100	SLA08100	862399	1065131	0.6	=	5.4	=	109	=	0.6	=	15.7	=	*	*	17.2	=	0.1	U	0.2	U	*	*	31.4	=
8	SLA25254	SLA25254	861700	1065462	0.6	J	8.8	J	130	=	0.0	U	17.8	=	0.2	UJ	13.1	J	4.0	=	0.1	U	29.8	J	33.3	=
8	SLA25259	SLA25259	861826	1065407	0.7	J	17.2	J	181	=	0.0	U	18.0	=	1.1	J	35.6	J	0.2	UJ	0.1	U	3.7	J	43.9	=
8	SLA75440	SLA75440	861184	1065642	0.1	U	7.1	=	125	=	0.2	U	16.3	=	0.4	U	12.4	=	0.6	=	0.5	=	29.5	=	25.6	=
8	SLA75441	SLA75441	861218	1065642	0.1	U	4.2	=	79	=	0.2	U	13.1	=	0.4	U	10.5	=	0.1	U	0.1	U	23.2	=	21.5	=
8	SLA75874	SLA75874	860906	1065654	0.2	U	10.9	=	147	=	0.2	U	18.9	=	0.0	U	24.4	=	0.7	U	0.1	U	0.1	U	37.6	=
8	SLA77808	SLA77808	860587	1065613	0.1	U	10.2	=	125	=	0.0	U	15.9	=	0.1	U	15.4	=	0.3	U	4.9	=	0.6	U	32.0	=
8	SLA77813	SLA77813	860505	1065584	0.2	U	12.2	=	191	=	0.1	U	16.3	=	0.2	U	21.2	=	0.2	U	5.8	=	0.6	U	33.7	=
8	SLA80453	SLA80453	860304	1065565	0.1	UJ	11.9	=	239	J	0.0	U	15.7	=	0.5	J	24.4	=	0.1	U	1.6	U	7.5	U	32.5	=
8	SLA83192	SLA83192	860115	1065515	0.1	U	2.3	=	142	=	0.0	U	14.3	=	0.2	=	12.7	=	1.3	=	0.7	U	31.8	U	19.3	=
8	SLA83201	SLA83201	860073	1065539	0.4	=	3.5	=	176	=	0.3	U	13.8	=	0.3	=	15.3	=	0.7	=	0.6	=	32.0	U	18.8	=
12	SLA79648	SLA79648[b]	859891	1065158	*	*	5.0	=	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	SLA81231	SLA81231	859941	1065148	0.4	=	29.3	=	144	=	0.2	=	16.2	=	1.5	=	0.1	=	0.2	=	1.6	=	4.2	U	30.2	=
12	SLA89593	SLA89593	862103	1065045	0.2	UJ	4.3	=	96	J	0.1	U	16.5	J	0.3	U	13.3	=	0.1	U	1.7	=	4.8	U	22.4	J
12	SLA86331	SLA86331	862463	1065017	0.0	U	0.1	=	2	=	0.0	U	0.2	=	0.0	U	0.2	=	0.0	U	0.0	=	0.1	U	0.3	=
12	SLA86701	SLA86701	860197	1065125	0.2	U	5.2	J	122	=	0.1	U	16.0	=	0.4	U	17.6	J	0.5	=	2.2	=	8.5	U	31.8	=
12	SLA86841	SLA86841	860148	1065148	0.5	=	0.1	U	208	=	0.1	UJ	0.1	UJ	0.5	U	17.9	J	0.1	U	0.3	U	8.9	U	24.6	=
12	SLA87083	SLA87083	860280	1065127	0.2	U	4.0	J	50	=	1.9	=	4.5	=	0.4	U	7.0	J	0.1	U	0.3	U	7.9	U	16.0	=
12	SLA87484	SLA87484	860333	1065117	0.2	U	7.6	J	145	=	0.1	U	17.3	=	0.4	U	15.3	J	1.1	=	1.9	=	8.8	U	27.0	=
12	SLA87960	SLA87960	860528	1065125	0.2	UJ	8.8	=	182	=	0.1	U	21.2	=	1.5	=	16.5	=	0.3	U	2.1	=	16.8	=	36.7	=
12	SLA91859	SLA91859	860986	1065098	0.2	U	14.5	=	207	=	0.1	U	19.2	=	0.3	U	30.8	=	0.1	U	8.2	=	5.0	U	40.9	=
12	SLA95743	SLA95743	861603	1065059	0.2	U	16.4	=	184	=	0.1	U	19.7	=	0.7	U	16.6	=	1.5	=	1.4	=	11.4	U	29.2	=

* Indicates that the sample was not analyzed for that COC.

[a] The antimony and thallium results for samples SLA86708, SLA88763, SLA88764, SLA88765, and SLA88766 were averaged together when evaluating EPCs for the SLAPS. Although shown in the table, arsenic is not a soil COC at the SLAPS.

[b] Surface samples. All other samples are subsurface samples.

Notes:

Validation qualifier (VQ) definitions are as follows: “=” for positive results, “U” for not detected above this value, “J” for estimated quantity, and “UJ” for not detected above estimated value.

Table G-2-5. ProUCL Input for SLAPS Soil Metals Data

Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)
0.1	9.7	149	0.2	17.4	0.8	16.2	0.2	0.6	7.4	26.9
0.1	3.4	94	0.1	26.7	0.9	9.6	0.2	0.7	7.5	19.3
0.1	19.5	130	0.1	17.8	0.9	19.8	0.2	2.3	7.5	31.7
0.1	7.8	241	0.1	20.6	0.8	16.4	0.2	2.1	7.3	35.2
0.1	4.7	175	0.0	19.9	0.8	17.4	0.5	3.6	7.3	25.8
0.7	7.0	330	0.3	16.5	2.2	26.4	0.3	1.0	33.5	34.3
0.7	9.3	276	0.3	17.7	2.0	17.9	0.3	1.8	32.3	29.6
0.6	259.0	130	0.6	17.3	0.8	15.8	0.2	0.6	7.0	25.8
0.5	7.9	113	0.2	12.7	4.3	17.6	0.3	2.6	6.1	28.5
0.3	6.9	94	0.1	16.9	0.1	20.3	0.1	3.3	3.8	31.7
0.2	8.9	128	0.0	16.6	0.4	22.3	0.1	2.5	14.4	27.9
0.1	9.7	149	0.7	12.1	0.7	29.7	0.1	2.1	0.6	26.7
0.2	2.2	112	0.2	12.6	0.2	21.5	0.1	0.2	8.3	20.4
0.2	8.3	139	0.1	12.6	0.4	17.5	0.1	0.2	3.3	27.2
0.1	12.2	140	0.2	21.2	0.1	28.0	0.1	1.8	0.6	38.5
0.1	10.4	164	0.2	15.0	0.4	16.2	0.1	1.2	0.6	15.0
0.2	4.5	57	0.1	18.6	0.5	15.4	0.9	1.7	9.0	27.1
0.2	6.0	72	0.1	18.4	1.5	17.1	1.3	2.2	27.2	35.7
0.2	8.0	91	0.1	16.6	1.1	15.3	1.0	2.6	8.8	27.9
0.2	7.1	79	0.1	16.6	1.0	13.3	0.2	2.2	8.9	24.5
0.1	0.1	202	0.0	14.9	0.1	17.2	0.6	0.2	7.7	20.7
3.9	4.5	166	0.0	11.7	0.2	13.4	0.5	0.2	25.1	19.4
0.1	3.7	126	0.0	14.9	0.4	18.2	0.1	0.2	5.8	26.2
0.1	8.8	204	0.0	21.3	0.1	23.7	0.1	0.2	0.6	33.6
0.2	10.2	524	0.1	18.2	0.5	20.2	0.4	2.6	8.9	27.7
0.2	3.0	54	0.1	16.4	2.0	12.5	1.2	2.7	9.5	18.0
0.2	7.1	129	0.1	18.3	0.5	16.5	1.5	2.3	8.9	27.3
0.2	4.0	42	0.1	16.4	2.1	12.5	1.2	1.5	8.9	24.7
0.2	23.3	1450	1.0	17.6	3.8	62.7	1.4	3.2	26.9	52.1
0.2	9.5	96	0.1	16.7	1.3	19.1	1.9	2.6	8.8	33.2
0.7	4.7	343	0.3	17.5	2.0	19.8	0.3	1.3	31.6	24.2
0.2	2.1	87	0.1	17.9	0.5	15.1	0.9	1.5	8.9	18.8
0.2	5.2	199	0.1	14.0	0.5	18.3	0.7	2.3	8.9	22.1
1.5	0.4	80	9.7	42.4	0.5	14.1	0.5	0.4	9.3	18.0
10.2	47.0	155	167	85.9	0.43	19.5	85	24.1	8.5	22.5
0.2	9.0	293	0.1	16.5	3.3	16.0	1.2	2.5	8.6	26.5
0.2	8.7	144	0.1	16.1	0.8	17.6	0.6	3.1	7.8	27.6
0.2	15.8	843	0.1	21.3	0.4	31.9	0.6	4.0	8.8	75.3
0.2	9.0	228	0.2	14.9	0.5	26.6	0.5	2.0	8.9	30.3
0.2	2.6	69	0.1	17.0	0.3	11.9	0.1	1.0	4.4	20.9
0.2	4.0	99	0.1	17.4	0.3	12.7	0.1	0.8	4.7	26.0
0.2	26.9	115	0.4	15.2	0.7	19.2	0.7	1.4	2.3	32.4
0.2	7.2	125	0.3	15.9	2.7	17.7	0.2	0.5	19.1	26.5
0.2	4.7	209	0.5	13.0	5.9	17.8	1.3	0.2	1.7	22.3
0.2	22.7	257	0.8	14.3	0.9	19.2	3.1	0.2	8.8	30.5
0.4	7.0	173	0.5	15.1	0.7	15.7	0.1	0.2	1.8	28.6
0.7	8.6	132	0.3	14.2	0.4	19.2	1.6	0.2	1.8	29.4
0.3	5.7	206	0.3	14.5	0.6	17.8	1.4	0.2	1.8	27.2
4.1	1.6	54	0.3	16.8	2.7	10.4	1.6	0.7	14.2	19.7
0.5	12.7	160	0.5	17.2	5.6	24.9	0.3	0.0	8.3	35.5
0.5	9.1	215	0.9	17.9	7.5	38.2	1.0	0.3	7.8	35.0
0.2	3.6	228	0.2	10.4	0.7	18.1	0.1	0.4	3.3	22.4
0.3	10.2	169	0.0	17.2	1.8	18.9	0.2	0.6	2.9	31.1
0.1	9.4	162	0.3	13.0	2.2	22.2	0.2	0.7	3.0	28.5
0.1	4.4	100	0.0	13.7	0.2	10.8	0.5	0.6	3.0	29.8

Table G-2-5. ProUCL Input for SLAPS Soil Metals Data

Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)
0.2	3.2	50	0.4	8.7	0.1	9.8	1.3	0.2	1.5	16.6
0.1	1.2	78	0.0	9.7	0.1	7.5	0.3	0.2	1.4	11.4
0.2	9.6	128	0.1	12.3	0.5	15.7	1.3	2.4	1.6	28.1
0.2	6.6	200	0.1	11.6	1.7	26.6	0.1	2.2	1.6	24.9
0.3	7.6	157	0.3	13.1	2.1	13.9	3.6	0.6	29.6	27.2
0.6	6.5	183	0.2	13.3	1.1	20.9	0.3	1.4	29.5	24.5
3.8	6.8	70	0.3	12.1	2.6	11.3	5.0	0.3	31.8	25.1
3.8	2.7	58	0.3	16.0	2.5	12.5	1.2	0.5	31.4	26.8
0.2	2.6	35	0.3	16.5	2.6	9.5	1.1	1.4	4.5	23.9
3.9	2.6	39	0.3	17.0	2.6	11.3	1.6	1.4	32.0	20.8
0.1	9.1	322	0.2	17.8	0.4	19.9	1.2	0.1	4.9	39.5
0.1	3.7	78	0.2	19.4	1.2	14.2	1.3	0.1	4.9	36.2
0.2	12.1	106	0.1	22.5	0.3	10.8	0.5	2.5	4.7	33.9
0.2	3.6	109	0.1	14.0	0.3	11.8	0.3	2.6	4.5	21.7
0.2	6.1	196	0.3	14.6	0.9	24.7	0.1	1.9	3.7	26.0
0.2	3.7	92	0.1	13.0	0.3	14.5	0.1	0.7	4.6	22.0
0.2	5.6	74	0.1	12.7	0.3	10.1	0.1	0.9	4.8	22.1
0.9	4.9	156	0.1	11.7	0.3	16.3	0.5	0.3	4.7	20.8
0.2	24.8	260	0.1	16.0	2.5	23.9	0.1	7.2	4.6	34.9
0.2	3.8	201	0.3	10.7	0.8	28.7	0.1	0.1	13.5	17.5
0.2	4.5	144	0.1	11.3	0.8	17.3	0.1	0.1	13.7	20.7
0.2	6.5	59	0.1	12.1	0.8	11.6	0.2	0.1	12.7	26.0
0.2	10.9	64	0.1	12.0	0.8	12.2	0.6	0.7	12.7	26.6
0.2	3.5	117	0.1	11.0	0.8	14.1	0.1	0.4	13.5	19.3
0.2	2.8	69	0.1	13.0	0.8	11.0	1.6	0.9	13.3	21.1
0.2	5.3	164	0.2	11.9	0.8	21.7	0.4	1.1	12.6	27.3
0.2	8.6	270	0.1	14.0	2.6	13.3	1.3	1.6	13.3	23.6
0.2	3.5	73	0.1	13.3	0.8	8.9	0.4	0.9	12.9	23.1
0.2	4.1	162	0.1	10.1	0.8	23.8	0.1	1.0	12.5	23.4
0.2	1.9	183	0.1	9.1	0.7	12.9	1.6	1.9	12.3	14.5
0.2	6.6	137	0.1	13.5	1.7	20.9	0.3	1.9	11.8	23.1
0.2	11.2	123	0.1	13.5	2.1	17.1	0.6	0.6	12.1	27.8
0.5	7.1	108	0.0	16.1	0.5	18.6	0.3	1.5	14.8	24.1
0.2	8.7	180	0.0	18.0	0.3	25.3	0.2	1.5	19.6	27.4
0.2	3.8	89	0.1	11.9	0.3	13.8	0.1	1.0	4.6	22.2
0.2	7.4	80	0.1	12.7	0.3	15.4	0.1	0.3	4.6	28.2
0.2	21.2	98	0.1	12.4	0.7	18.4	0.1	0.3	4.6	29.2
0.2	7.1	160	0.1	17.5	0.8	18.4	0.4	0.1	13.4	27.8
0.2	5.5	139	0.1	15.6	0.8	16.7	0.1	0.1	12.8	21.7
0.2	10.3	77	0.2	13.6	0.8	16.1	0.1	0.1	12.7	21.4
0.2	1.5	65	0.1	10.7	0.8	7.6	0.1	0.1	12.8	14.8
0.2	3.1	73	0.1	13.9	0.8	12.1	0.1	0.1	13.1	23.4
2.2	4.7	102	0.2	14.8	0.4	23.3	0.1	1.1	8.3	22.5
2.2	7.0	123	0.2	14.1	0.4	19.9	0.5	1.1	8.2	24.1
2.1	8.3	194	0.2	13.4	1.3	24.7	0.1	0.9	7.8	27.0
11.5	16.4	232	1.2	19.5	2.3	41.1	0.2	1.2	42.4	37.6
11.2	17.7	309	1.2	21.9	2.2	65.3	0.2	3.5	41.5	45.5
2.6	8.4	138	0.3	16.1	1.4	22.7	0.5	0.8	9.4	27.1
0.2	4.9	79	0.0	14.3	0.4	18.7	0.2	0.2	1.3	22.0
0.2	8.2	146	0.3	16.5	0.5	20.1	0.5	0.1	0.9	26.1
0.1	3.2	65	0.0	12.0	0.2	11.7	0.2	0.1	0.9	21.9
0.7	12.2	360	0.2	18.3	0.3	51.8	0.3	0.4	49.4	37.9
0.7	16.3	218	0.3	17.0	0.3	29.0	0.4	0.4	23.6	40.5
0.5	11.2	626	0.1	18.5	3.0	55.2	0.8	1.9	52.8	38.8
0.4	18.2	416	0.1	18.9	23.6	57.1	1.1	2.9	10.8	49.3

Table G-2-5. ProUCL Input for SLAPS Soil Metals Data

Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)
0.2	2.5	70	0.1	12.7	0.3	17.1	0.1	0.9	4.7	20.5
0.6	19.6	271	0.0	17.6	0.4	42.6	0.8	1.0	1.3	41.0
0.3	15.1	235	0.0	21.9	0.1	27.9	1.1	0.4	1.3	43.5
0.6	5.4	109	0.6	15.7	0.2	17.2	0.1	0.2	29.8	31.4
0.6	8.8	130	0.0	17.8	1.1	13.1	4.0	0.1	3.7	33.3
0.7	17.2	181	0.0	18.0	0.4	35.6	0.2	0.1	29.5	43.9
0.1	7.1	125	0.2	16.3	0.4	12.4	0.6	0.5	23.2	25.6
0.1	4.2	79	0.2	13.1	0.0	10.5	0.1	0.1	0.1	21.5
0.2	10.9	147	0.2	18.9	0.1	24.4	0.7	0.1	0.6	37.6
0.1	10.2	125	0.0	15.9	0.2	15.4	0.3	4.9	0.6	32.0
0.2	12.2	191	0.1	16.3	0.5	21.2	0.2	5.8	7.5	33.7
0.1	11.9	239	0.0	15.7	0.2	24.4	0.1	1.6	31.8	32.5
0.1	2.3	142	0.0	14.3	0.3	12.7	1.3	0.7	32.0	19.3
0.4	3.5	176	0.3	13.8	1.5	15.3	0.7	0.6	4.2	18.8
0.4	5.0	144	0.2	16.2	0.3	0.1	0.2	1.6	4.8	30.2
0.2	29.3	96	0.1	16.5	0.0	13.3	0.1	1.7	0.1	22.4
0.0	4.3	2	0.0	0.2	0.4	0.2	0.0	0.0	8.5	0.3
0.2	0.1	122	0.1	16.0	0.5	17.6	0.5	2.2	8.9	31.8
0.5	5.2	208	0.1	0.1	0.4	17.9	0.1	0.3	7.9	24.6
0.2	0.1	50	1.9	4.5	0.4	7.0	0.1	0.3	8.8	16.0
0.2	4.0	145	0.1	17.3	1.5	15.3	1.1	1.9	16.8	27.0
0.2	7.6	182	0.1	21.2	0.3	16.5	0.3	2.1	5.0	36.7
0.2	8.8	207	0.1	19.2	0.7	30.8	0.1	8.2	11.4	40.9
0.2	14.5	184	0.1	19.7	---	16.6	1.5	1.4	---	29.2
---	16.4	---	---	---	---	---	---	---	---	---

"---" Data not available

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

User Selected Options	
Date/Time of Computation	10/21/2014 2:46:22 PM
From File	Tbls G-2-1 thru G-2-8_Revised EPC Calcs for SLAPS_Metals_d.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Antimony (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	58
		Number of Missing Observations	0
Minimum	0.0013	Mean	0.7
Maximum	11.45	Median	0.21
SD	1.742	Std. Error of Mean	0.15
Coefficient of Variation	2.487	Skewness	4.932

Normal GOF Test

Shapiro Wilk Test Statistic	0.355	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.392	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.95	5% Adjusted-CLT UCL (Chen-1995)	1.016
		5% Modified-t UCL (Johnson-1978)	0.96

Gamma GOF Test

A-D Test Statistic	20.08	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.803	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.328	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0843	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.676	k star (bias corrected MLE)	0.666
Theta hat (MLE)	1.036	Theta star (bias corrected MLE)	1.052
nu hat (MLE)	181.1	nu star (bias corrected)	178.4
MLE Mean (bias corrected)	0.7	MLE Sd (bias corrected)	0.858
		pproximate Chi Square Value (0.05)	148.5
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	148.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.841	sted Gamma UCL (use when n<50)	0.843

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.789	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-6.645	Mean of logged Data	-1.255
Maximum of Logged Data	2.438	SD of logged Data	1.095

Assuming Lognormal Distribution

95% H-UCL	0.645	90% Chebyshev (MVUE) UCL	0.697
95% Chebyshev (MVUE) UCL	0.78	97.5% Chebyshev (MVUE) UCL	0.894
99% Chebyshev (MVUE) UCL	1.118		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	0.948	95% Jackknife UCL	0.95
95% Standard Bootstrap UCL	0.95	95% Bootstrap-t UCL	1.097
95% Hall's Bootstrap UCL	1	95% Percentile Bootstrap UCL	0.978
95% BCA Bootstrap UCL	1.015		
90% Chebyshev(Mean, Sd) UCL	1.152	95% Chebyshev(Mean, Sd) UCL	1.356
97.5% Chebyshev(Mean, Sd) UCL	1.64	99% Chebyshev(Mean, Sd) UCL	2.197

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	1.356

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Arsenic (mg/kg)

General Statistics

Total Number of Observations	135	Number of Distinct Observations	94
		Number of Missing Observations	0
Minimum	0.071	Mean	10.1
Maximum	259	Median	7.1
SD	22.53	Std. Error of Mean	1.939
Coefficient of Variation	2.23	Skewness	10.25

Normal GOF Test

Shapiro Wilk Test Statistic	0.27	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.328	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0763	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	13.31	5% Adjusted-CLT UCL (Chen-1995)	15.12
		5% Modified-t UCL (Johnson-1978)	13.6

Gamma GOF Test

A-D Test Statistic	4.908	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.779	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0825	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.166	k star (bias corrected MLE)	1.145
Theta hat (MLE)	8.662	Theta star (bias corrected MLE)	8.82
nu hat (MLE)	314.9	nu star (bias corrected)	309.2
MLE Mean (bias corrected)	10.1	MLE Sd (bias corrected)	9.439
		pproximate Chi Square Value (0.05)	269.5
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	269.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11.59	sted Gamma UCL (use when n<50)	11.61

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0763	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.645	Mean of logged Data	1.826
Maximum of Logged Data	5.557	SD of logged Data	1.002

Assuming Lognormal Distribution

95% H-UCL	12.41	90% Chebyshev (MVUE) UCL	13.38
95% Chebyshev (MVUE) UCL	14.83	97.5% Chebyshev (MVUE) UCL	16.83
99% Chebyshev (MVUE) UCL	20.76		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	13.29	95% Jackknife UCL	13.31
95% Standard Bootstrap UCL	13.29	95% Bootstrap-t UCL	20.06
95% Hall's Bootstrap UCL	25.81	95% Percentile Bootstrap UCL	13.71
95% BCA Bootstrap UCL	16.24		
90% Chebyshev(Mean, Sd) UCL	15.92	95% Chebyshev(Mean, Sd) UCL	18.55
97.5% Chebyshev(Mean, Sd) UCL	22.21	99% Chebyshev(Mean, Sd) UCL	29.4

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 18.55

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Barium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	117
		Number of Missing Observations	0
Minimum	2.1	Mean	167.9
Maximum	1450	Median	139
SD	155.3	Std. Error of Mean	13.42
Coefficient of Variation	0.925	Skewness	5.216

Normal GOF Test

Shapiro Wilk Test Statistic	0.595	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	190.1	5% Adjusted-CLT UCL (Chen-1995)	196.4
		5% Modified-t UCL (Johnson-1978)	191.1

Gamma GOF Test

A-D Test Statistic	2.416	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0816	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.348	k star (bias corrected MLE)	2.3
Theta hat (MLE)	71.49	Theta star (bias corrected MLE)	72.97
nu hat (MLE)	629.2	nu star (bias corrected)	616.5
MLE Mean (bias corrected)	167.9	MLE Sd (bias corrected)	110.7
		pproximate Chi Square Value (0.05)	559.9
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	559.3

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	184.8	sted Gamma UCL (use when n<50)	185

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	4.0000E-8	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0801	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.742	Mean of logged Data	4.895
Maximum of Logged Data	7.279	SD of logged Data	0.692

Assuming Lognormal Distribution

95% H-UCL	190.9	90% Chebyshev (MVUE) UCL	203.1
95% Chebyshev (MVUE) UCL	218.3	97.5% Chebyshev (MVUE) UCL	239.4
99% Chebyshev (MVUE) UCL	281		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	189.9	95% Jackknife UCL	190.1
95% Standard Bootstrap UCL	190.2	95% Bootstrap-t UCL	202.3
95% Hall's Bootstrap UCL	225	95% Percentile Bootstrap UCL	190.8
95% BCA Bootstrap UCL	200.8		
90% Chebyshev(Mean, Sd) UCL	208.1	95% Chebyshev(Mean, Sd) UCL	226.3
97.5% Chebyshev(Mean, Sd) UCL	251.6	99% Chebyshev(Mean, Sd) UCL	301.3

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 226.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Cadmium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	60
		Number of Missing Observations	0
Minimum	1.4000E-4	Mean	1.511
Maximum	167	Median	0.085
SD	14.43	Std. Error of Mean	1.246
Coefficient of Variation	9.547	Skewness	11.52

Normal GOF Test

Shapiro Wilk Test Statistic	0.101	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.486	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.576	5% Adjusted-CLT UCL (Chen-1995)	4.887
		5% Modified-t UCL (Johnson-1978)	3.783

Gamma GOF Test

A-D Test Statistic	28.14	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.88	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.374	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0881	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.276	k star (bias corrected MLE)	0.275
Theta hat (MLE)	5.476	Theta star (bias corrected MLE)	5.5
nu hat (MLE)	73.97	nu star (bias corrected)	73.65
MLE Mean (bias corrected)	1.511	MLE Sd (bias corrected)	2.883
		pproximate Chi Square Value (0.05)	54.89
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	54.71

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2.028	sted Gamma UCL (use when n<50)	2.035

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	6.233E-13	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.184	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-8.874	Mean of logged Data	-2.119
Maximum of Logged Data	5.118	SD of logged Data	1.387

Assuming Lognormal Distribution

95% H-UCL	0.428	90% Chebyshev (MVUE) UCL	0.461
95% Chebyshev (MVUE) UCL	0.529	97.5% Chebyshev (MVUE) UCL	0.624
99% Chebyshev (MVUE) UCL	0.811		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	3.562	95% Jackknife UCL	3.576
95% Standard Bootstrap UCL	3.489	95% Bootstrap-t UCL	83.01
95% Hall's Bootstrap UCL	35.11	95% Percentile Bootstrap UCL	3.989
95% BCA Bootstrap UCL	6.445		
90% Chebyshev(Mean, Sd) UCL	5.251	95% Chebyshev(Mean, Sd) UCL	6.945
97.5% Chebyshev(Mean, Sd) UCL	9.296	99% Chebyshev(Mean, Sd) UCL	13.91

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	6.945

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Chromium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	82
		Number of Missing Observations	0
Minimum	0.115	Mean	16
Maximum	85.9	Median	15.95
SD	7.491	Std. Error of Mean	0.647
Coefficient of Variation	0.468	Skewness	6.362

Normal GOF Test

Shapiro Wilk Test Statistic	0.558	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	17.07	5% Adjusted-CLT UCL (Chen-1995)	17.44
		5% Modified-t UCL (Johnson-1978)	17.13

Gamma GOF Test

A-D Test Statistic	11.93	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0808	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.963	k star (bias corrected MLE)	4.857
Theta hat (MLE)	3.223	Theta star (bias corrected MLE)	3.294
nu hat (MLE)	1330	nu star (bias corrected)	1302
MLE Mean (bias corrected)	16	MLE Sd (bias corrected)	7.259
		pproximate Chi Square Value (0.05)	1219
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	1218

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	17.08	sted Gamma UCL (use when n<50)	17.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.484	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.277	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.163	Mean of logged Data	2.668
Maximum of Logged Data	4.453	SD of logged Data	0.637

Assuming Lognormal Distribution

95% H-UCL	19.61	90% Chebyshev (MVUE) UCL	20.79
95% Chebyshev (MVUE) UCL	22.22	97.5% Chebyshev (MVUE) UCL	24.21
99% Chebyshev (MVUE) UCL	28.13		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	17.06	95% Jackknife UCL	17.07
95% Standard Bootstrap UCL	17.08	95% Bootstrap-t UCL	17.8
95% Hall's Bootstrap UCL	22.35	95% Percentile Bootstrap UCL	17.15
95% BCA Bootstrap UCL	17.51		
90% Chebyshev(Mean, Sd) UCL	17.94	95% Chebyshev(Mean, Sd) UCL	18.82
97.5% Chebyshev(Mean, Sd) UCL	20.04	99% Chebyshev(Mean, Sd) UCL	22.44

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	18.82

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Molybdenum (mg/kg)

General Statistics

Total Number of Observations	133	Number of Distinct Observations	76
		Number of Missing Observations	0
Minimum	0.00455	Mean	1.209
Maximum	23.6	Median	0.69
SD	2.283	Std. Error of Mean	0.198
Coefficient of Variation	1.888	Skewness	7.559

Normal GOF Test

Shapiro Wilk Test Statistic	0.426	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0768	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.537	5% Adjusted-CLT UCL (Chen-1995)	1.674
		5% Modified-t UCL (Johnson-1978)	1.559

Gamma GOF Test

A-D Test Statistic	3.365	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.788	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0836	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.905	k star (bias corrected MLE)	0.889
Theta hat (MLE)	1.337	Theta star (bias corrected MLE)	1.36
nu hat (MLE)	240.7	nu star (bias corrected)	236.6
MLE Mean (bias corrected)	1.209	MLE Sd (bias corrected)	1.282
		pproximate Chi Square Value (0.05)	202
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	201.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.417	sted Gamma UCL (use when n<50)	1.419

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.14	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0768	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.393	Mean of logged Data	-0.456
Maximum of Logged Data	3.161	SD of logged Data	1.153

Assuming Lognormal Distribution

95% H-UCL	1.558	90% Chebyshev (MVUE) UCL	1.685
95% Chebyshev (MVUE) UCL	1.895	97.5% Chebyshev (MVUE) UCL	2.186
99% Chebyshev (MVUE) UCL	2.757		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.535	95% Jackknife UCL	1.537
95% Standard Bootstrap UCL	1.546	95% Bootstrap-t UCL	1.841
95% Hall's Bootstrap UCL	2.919	95% Percentile Bootstrap UCL	1.571
95% BCA Bootstrap UCL	1.723		
90% Chebyshev(Mean, Sd) UCL	1.803	95% Chebyshev(Mean, Sd) UCL	2.072
97.5% Chebyshev(Mean, Sd) UCL	2.446	99% Chebyshev(Mean, Sd) UCL	3.179

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	2.072

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Nickel (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	103
		Number of Missing Observations	0
Minimum	0.11	Mean	19.33
Maximum	65.3	Median	17.35
SD	10.27	Std. Error of Mean	0.887
Coefficient of Variation	0.531	Skewness	2.264

Normal GOF Test

Shapiro Wilk Test Statistic	0.792	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.8	5% Adjusted-CLT UCL (Chen-1995)	20.97
		5% Modified-t UCL (Johnson-1978)	20.83

Gamma GOF Test

A-D Test Statistic	4.957	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0811	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.452	k star (bias corrected MLE)	3.38
Theta hat (MLE)	5.599	Theta star (bias corrected MLE)	5.718
nu hat (MLE)	925.3	nu star (bias corrected)	905.9
MLE Mean (bias corrected)	19.33	MLE Sd (bias corrected)	10.51
		pproximate Chi Square Value (0.05)	837
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	836.3

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	20.92	sted Gamma UCL (use when n<50)	20.94

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.647	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.207	Mean of logged Data	2.81
Maximum of Logged Data	4.179	SD of logged Data	0.723

Assuming Lognormal Distribution

95% H-UCL	24.4	90% Chebyshev (MVUE) UCL	26.01
95% Chebyshev (MVUE) UCL	28.04	97.5% Chebyshev (MVUE) UCL	30.87
99% Chebyshev (MVUE) UCL	36.42		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	20.79	95% Jackknife UCL	20.8
95% Standard Bootstrap UCL	20.81	95% Bootstrap-t UCL	21.07
95% Hall's Bootstrap UCL	21.02	95% Percentile Bootstrap UCL	20.82
95% BCA Bootstrap UCL	21.03		
90% Chebyshev(Mean, Sd) UCL	21.99	95% Chebyshev(Mean, Sd) UCL	23.2
97.5% Chebyshev(Mean, Sd) UCL	24.87	99% Chebyshev(Mean, Sd) UCL	28.16

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	23.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Selenium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	73
		Number of Missing Observations	0
Minimum	0.0019	Mean	1.244
Maximum	85	Median	0.313
SD	7.329	Std. Error of Mean	0.633
Coefficient of Variation	5.892	Skewness	11.39

Normal GOF Test

Shapiro Wilk Test Statistic	0.138	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.436	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.293	5% Adjusted-CLT UCL (Chen-1995)	2.951
		5% Modified-t UCL (Johnson-1978)	2.396

Gamma GOF Test

A-D Test Statistic	12.34	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.818	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.213	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0853	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.511	k star (bias corrected MLE)	0.505
Theta hat (MLE)	2.434	Theta star (bias corrected MLE)	2.465
nu hat (MLE)	136.9	nu star (bias corrected)	135.2
MLE Mean (bias corrected)	1.244	MLE Sd (bias corrected)	1.751
		pproximate Chi Square Value (0.05)	109.4
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	109.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.538	sted Gamma UCL (use when n<50)	1.542

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	3.8607E-6	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-6.266	Mean of logged Data	-1.021
Maximum of Logged Data	4.443	SD of logged Data	1.208

Assuming Lognormal Distribution

95% H-UCL	0.96	90% Chebyshev (MVUE) UCL	1.039
95% Chebyshev (MVUE) UCL	1.174	97.5% Chebyshev (MVUE) UCL	1.361
99% Chebyshev (MVUE) UCL	1.729		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	2.285	95% Jackknife UCL	2.293
95% Standard Bootstrap UCL	2.286	95% Bootstrap-t UCL	9.586
95% Hall's Bootstrap UCL	6.219	95% Percentile Bootstrap UCL	2.483
95% BCA Bootstrap UCL	3.23		
90% Chebyshev(Mean, Sd) UCL	3.143	95% Chebyshev(Mean, Sd) UCL	4.004
97.5% Chebyshev(Mean, Sd) UCL	5.198	99% Chebyshev(Mean, Sd) UCL	7.544

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	4.004

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Thallium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	75
		Number of Missing Observations	0
Minimum	0.007	Mean	1.449
Maximum	24.06	Median	0.91
SD	2.384	Std. Error of Mean	0.206
Coefficient of Variation	1.645	Skewness	6.849

Normal GOF Test

Shapiro Wilk Test Statistic	0.5	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.79	5% Adjusted-CLT UCL (Chen-1995)	1.918
		5% Modified-t UCL (Johnson-1978)	1.811

Gamma GOF Test

A-D Test Statistic	0.99	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.792	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.076	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0836	Detected data appear Gamma Distributed at 5% Significance Lev	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.821	k star (bias corrected MLE)	0.808
Theta hat (MLE)	1.764	Theta star (bias corrected MLE)	1.794
nu hat (MLE)	220.1	nu star (bias corrected)	216.5
MLE Mean (bias corrected)	1.449	MLE Sd (bias corrected)	1.612
		pproximate Chi Square Value (0.05)	183.5
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	183.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.71	sted Gamma UCL (use when n<50)	1.713

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0263	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.962	Mean of logged Data	-0.349
Maximum of Logged Data	3.181	SD of logged Data	1.319

Assuming Lognormal Distribution

95% H-UCL	2.243	90% Chebyshev (MVUE) UCL	2.421
95% Chebyshev (MVUE) UCL	2.763	97.5% Chebyshev (MVUE) UCL	3.239
99% Chebyshev (MVUE) UCL	4.172		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.788	95% Jackknife UCL	1.79
95% Standard Bootstrap UCL	1.786	95% Bootstrap-t UCL	2.032
95% Hall's Bootstrap UCL	3.29	95% Percentile Bootstrap UCL	1.815
95% BCA Bootstrap UCL	1.952		
90% Chebyshev(Mean, Sd) UCL	2.067	95% Chebyshev(Mean, Sd) UCL	2.347
97.5% Chebyshev(Mean, Sd) UCL	2.735	99% Chebyshev(Mean, Sd) UCL	3.498

Suggested UCL to Use

95% Approximate Gamma UCL	1.71

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Uranium (mg/kg)

General Statistics

Total Number of Observations	133	Number of Distinct Observations	98
		Number of Missing Observations	0
Minimum	0.09	Mean	11.18
Maximum	52.8	Median	8.45
SD	10.67	Std. Error of Mean	0.925
Coefficient of Variation	0.954	Skewness	1.691

Normal GOF Test

Shapiro Wilk Test Statistic	0.801	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0768	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	12.71	5% Adjusted-CLT UCL (Chen-1995)	12.84
		5% Modified-t UCL (Johnson-1978)	12.73

Gamma GOF Test

A-D Test Statistic	1.243	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.78	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.093	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0831	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.144	k star (bias corrected MLE)	1.123
Theta hat (MLE)	9.77	Theta star (bias corrected MLE)	9.95
nu hat (MLE)	304.3	nu star (bias corrected)	298.8
MLE Mean (bias corrected)	11.18	MLE Sd (bias corrected)	10.55
		pproximate Chi Square Value (0.05)	259.7
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	259.3

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	12.86	sted Gamma UCL (use when n<50)	12.88

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.2900E-7	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0768	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.408	Mean of logged Data	1.917
Maximum of Logged Data	3.967	SD of logged Data	1.158

Assuming Lognormal Distribution

95% H-UCL	16.83	90% Chebyshev (MVUE) UCL	18.2
95% Chebyshev (MVUE) UCL	20.48	97.5% Chebyshev (MVUE) UCL	23.63
99% Chebyshev (MVUE) UCL	29.83		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	12.7	95% Jackknife UCL	12.71
95% Standard Bootstrap UCL	12.69	95% Bootstrap-t UCL	12.91
95% Hall's Bootstrap UCL	12.86	95% Percentile Bootstrap UCL	12.7
95% BCA Bootstrap UCL	12.79		
90% Chebyshev(Mean, Sd) UCL	13.95	95% Chebyshev(Mean, Sd) UCL	15.21
97.5% Chebyshev(Mean, Sd) UCL	16.95	99% Chebyshev(Mean, Sd) UCL	20.38

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	15.21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-6. UCL Statistics for Uncensored SLAPS Soil Metals Data

Vanadium (mg/kg)

General Statistics

Total Number of Observations	134	Number of Distinct Observations	104
		Number of Missing Observations	0
Minimum	0.28	Mean	27.52
Maximum	75.3	Median	26.75
SD	8.61	Std. Error of Mean	0.744
Coefficient of Variation	0.313	Skewness	1.472

Normal GOF Test

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	6.5115E-8	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	28.76	5% Adjusted-CLT UCL (Chen-1995)	28.85
		5% Modified-t UCL (Johnson-1978)	28.77

Gamma GOF Test

A-D Test Statistic	3.478	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0807	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.799	k star (bias corrected MLE)	7.629
Theta hat (MLE)	3.529	Theta star (bias corrected MLE)	3.608
nu hat (MLE)	2090	nu star (bias corrected)	2045
MLE Mean (bias corrected)	27.52	MLE Sd (bias corrected)	9.965
		pproximate Chi Square Value (0.05)	1941
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	1939

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	29	sted Gamma UCL (use when n<50)	29.02

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.616	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0765	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.273	Mean of logged Data	3.25
Maximum of Logged Data	4.321	SD of logged Data	0.48

Assuming Lognormal Distribution

95% H-UCL	31.2	90% Chebyshev (MVUE) UCL	32.68
95% Chebyshev (MVUE) UCL	34.4	97.5% Chebyshev (MVUE) UCL	36.77
99% Chebyshev (MVUE) UCL	41.45		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	28.75	95% Jackknife UCL	28.76
95% Standard Bootstrap UCL	28.74	95% Bootstrap-t UCL	28.89
95% Hall's Bootstrap UCL	28.91	95% Percentile Bootstrap UCL	28.75
95% BCA Bootstrap UCL	28.83		
90% Chebyshev(Mean, Sd) UCL	29.76	95% Chebyshev(Mean, Sd) UCL	30.77
97.5% Chebyshev(Mean, Sd) UCL	32.17	99% Chebyshev(Mean, Sd) UCL	34.92

Suggested UCL to Use

95% Student's-t UCL	28.76	or 95% Modified-t UCL	28.77

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table G-2-7. SLAPS Surface Soil Exposure Point Concentrations

COC	EPC (mg/kg)	Basis
Antimony	1.4	Chebyshev UCL_{95}
Arsenic	Not a COC	Chebyshev UCL_{95}
Barium	226	Chebyshev UCL_{95}
Cadmium	6.9	Chebyshev UCL_{95}
Chromium	19	Chebyshev UCL_{95}
Molybdenum	2.072	Chebyshev UCL_{95}
Nickel	23	Chebyshev UCL_{95}
Selenium	4.0	Chebyshev UCL_{95}
Thallium	1.7	Approximate Gamma UCL_{95}
Uranium	15	Chebyshev UCL_{95}
Vanadium	29	Modified-t UCL_{95}

Table G-2-8. SLAPS Subsurface Soil Exposure Point Concentrations

COC	EPC (mg/kg)	Basis
Antimony	1.4	Chebyshev UCL_{95}
Arsenic	Not a COC	Chebyshev UCL_{95}
Thallium	1.7	Approximate Gamma UCL_{95}
Uranium	15	Chebyshev UCL_{95}