REVISION 0

NORTH ST. LOUIS COUNTY SITES ANNUAL ENVIRONMENTAL MONITORING DATA AND ANALYSIS REPORT FOR CALENDAR YEAR 2013

ST. LOUIS, MISSOURI

JULY 23, 2014

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

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prepared by:

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

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ACRONYMS AND ABBREVIATIONS

Both English and metrics 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	microcurie(s) per milliliter
µg/L	microgram(s) per liter
µS/cm	microSiemen(s) per centimeter
Ac	actinium
AEC	Atomic Energy Commission
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
ATD	alpha track detector
bgs	below ground surface
BOD	biological oxygen demand
BTOC	below top of casing
°C	degrees Celsius (centigrade)
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
Ci	curie(s)
cm	centimeter(s)
COC	contaminant of concern
COD	chemical oxygen demand
CSR	*Code of State Regulations*
CWC	Coldwater Creek
CY	calendar year
DCF	dose conversion factor
DHSS	Department of Health and Senior Services
DL	detection limit
DO	dissolved oxygen
DOD	U.S. Department of Defense
DOD QSM	*Department of Defense Quality Systems Manual*
DOE	U.S. Department of Energy
DQO	data quality objective
EDE	effective dose equivalent
EE/CA	engineering evaluation/cost analysis
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
EMDAR	Environmental Monitoring Data and Analysis Report
EMG	Environmental Monitoring Guide
EMICY	Environmental Monitoring Implementation for Calendar Year
EMICY13	*Environmental Monitoring Implementation Plan for the North St. Louis County Sites for CY 2013*
EMP	Environmental Monitoring Program
FFA	Federal Facility Agreement

ACRONYMS AND ABBREVIATIONS (Continued)

ft	foot/feet
ft^2	square foot/feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
Futura	Futura Coatings Company
FWV	field work variance
g	gram(s)
HISS	Hazelwood Interim Storage Site
HZ	hydrostratigraphic zone
IA	investigation area
ICP	inductively coupled plasma
ICV	initial calibration verification
KPA	kinetic phosphorescence analysis
L	liter(s)
LCL_{95}	95 percent lower confidence limit
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
MARSSIM	*Multi-Agency Radiation Survey and Site Investigation Manual*
MDA	minimum detectable activity
MDC	minimum detectable concentration
MDL	method detection limit
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
mg	milligram(s)
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
MGD	million gallons per day
mSv/yr	millisievert(s) per year
mL	milliliter(s)
mL/L/hr	milliliter(s) per liter per hour
mL/min	milliliter(s) per minute
mrem	millirem
mrem/pCi	millirem per picocurie
mrem/qtr	millirem per quarter
mrem/yr	millirem per year
MSD	Metropolitan St. Louis Sewer District
mV	millivolt(s)
NAD	normalized absolute difference
NC	North St. Louis County
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NTU	nephelometric turbidity unit
ORP	oxidation reduction potential
Pa	protactinium

ACRONYMS AND ABBREVIATIONS (Continued)

pCi/µg	picocurie(s) per microgram
pCi/g	picocurie(s) per gram
pCi/L	picocurie(s) per liter
PDI	pre-design investigation
QA	quality assurance
QAPP	Quality Assurance Program Plan
QC	quality control
RA	remedial action
Ra	radium
RCRA	Resource Conservation and Recovery Act
RG	remediation goal
RL	reporting limit
RME	reasonably maximally exposed
Rn	radon
ROD	*Record of Decision for the North St. Louis County Sites*
ROW	right of way
RPD	relative percent difference
S	test statistic
SAG	*Sampling and Analysis Guide for the St. Louis Sites*
SAIC	Science Application International Corporation
SLAPS	St. Louis Airport Site
SLS	St. Louis Sites
SOP	standard operating procedure
SOR	sum of ratios
SS	settleable solid(s)
SU	survey unit
TEDE	total effective dose equivalent
Th	thorium
TLD	thermoluminescent dosimeter
TPH	total petroleum hydrocarbon
TRPH	total recoverable petroleum hydrocarbon
TSS	total suspended solid(s)
U	uranium
UCL	upper confidence limit
UCL_{95}	95 percent upper confidence limit
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VQ	validation qualifier
VP	vicinity property
WL	working level
WLM	working level month
WRS	Wilcoxon Rank Sum
yd^3	cubic yard(s)

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EXECUTIVE SUMMARY

This Annual Environmental Monitoring Data and Analysis Report (EMDAR) for calendar year (CY) 2013 applies to the North St. Louis County (NC) Sites within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This EMDAR provides an evaluation of the data collected as part of the implementation of the Environmental Monitoring Program (EMP) for the NC Sites within the FUSRAP. Environmental monitoring of various media at the Latty Avenue Properties (Futura Coatings Company [Futura], the Hazelwood Interim Storage Site [HISS], and other Vicinity Properties [VPs]), the St. Louis Airport Site (SLAPS), and SLAPS VPs is required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and a commitment outlined in the St. Louis FUSRAP Federal Facility Agreement (FFA).

The purpose of this report is:

1) to document the environmental monitoring activities, and
2) to assess whether the remedial actions (RAs) had a measurable environmental impact by:
    a) reporting the current condition of the NC Sites,
    b) summarizing the data collection effort for CY 2013, and
    c) providing an analysis of the environmental monitoring data to date.

The U.S. Army Corps of Engineers (USACE), St. Louis District, collects comprehensive environmental data for decision-making and planning purposes. Environmental monitoring, performed as a Best Management Practice or as a component of RAs, serves as a critical component in the evaluation of the current status of residual contaminants and assessment of the potential future migration of residual contaminants.

All environmental monitoring required through implementation of the *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for CY 2013* (EMICY13) (USACE 2012) was conducted as planned during CY 2013. The evaluation of environmental monitoring data for all NC Sites demonstrates compliance with *Record of Decision for the North St. Louis County Sites* (ROD) (USACE 2005) goals and applicable or relevant and appropriate requirements (ARARs).

RADIOLOGICAL AIR MONITORING

Radiological air data was collected and evaluated at the NC Sites through airborne radioactive particulate, radon (indoor and outdoor), and gamma radiation monitoring as required in the EMICY13 (USACE 2012). In addition to being used for environmental monitoring purposes, radiological air data was also used as inputs to calculate total effective dose equivalent (TEDE) to the reasonably maximally exposed (RME) member of the public for the NC Sites.

The TEDE calculated for the RME individual at the SLAPS and SLAPS VPs were all less than 0.1 millirem per year (mrem/yr) (0.001 millisievert per year [mSv/yr]). The calculated TEDE is compliant with the 100 mrem/yr (1 mSv/yr) limit provided in 10 *Code of Federal Regulations (CFR)* 20.1301.

The radiological air monitoring results conducted at the NC Sites demonstrated compliance with all of the ARARs for the NC Sites as described in Tables 2-1 through 2-4 of the EMICY13 (USACE 2012).

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MONITORING

Discharge requirements for the NC Sites are currently set by the Missouri Department of Natural Resources (MDNR) National Pollutant Discharge Elimination System (NPDES) ARARs (permit-equivalent) document dated October 2, 1998 (MDNR 1998), and amended in a letter from the MDNR dated February 19, 2002 (MDNR 2002). As of November 26, 2013, the USACE increased the sampling frequency at Outfall 002 (PN02) from annually (MDNR 2002) to monthly, as established in the original permit equivalent agreement (MDNR 1998).

The storm-water sampling results for the NC Sites demonstrate compliance with the discharge limits described in Section 2.2.2 of the EMICY13 (USACE 2012).

EXCAVATION-WATER DISCHARGE MONITORING AT THE NORTH ST. LOUIS COUNTY SITES

CY 2013 was the twelfth year during which excavation water was treated and discharged from the NC Sites. Excavation water from the NC Sites discharged to the sanitary sewer system is subject to the requirements stated in the July 23, 2001, Metropolitan St. Louis Sewer District (MSD) authorization letter (MSD 2001) and the selenium discharge variance letter for the SLAPS dated February 10, 2005 (MSD 2005). This authorization was extended for 2 years through the issuance of a letter dated May 24, 2012, from Mr. Steve Grace to Ms. Sharon Cotner. This authorization expires on July 23, 2014 (MSD 2012a). The selenium discharge variance for the SLAPS was not utilized in CY 2013 (MSD 2005 and 2012a). There is no longer a requirement to analyze for barium, lead, and selenium after the first two batches from new investigative areas (MSD 2012a).

HISS laboratory waste water is discharged in accordance with the MSD discharge authorization letter dated January 31, 2012 (MSD 2012b). The special discharge authorization was extended to February 7, 2014. The data collected at each site were compared to discharge limits described in Section 2.2.2 of the EMICY13 (USACE 2012). During CY 2013, no exceedances of the discharge limits occurred at the HISS laboratory or the NC Sites.

COLDWATER CREEK MONITORING

The CY 2013 Coldwater Creek (CWC) surface-water and sediment sampling events completed in April and October of 2013 evaluated the physical, radiological, and chemical conditions in the creek. Samples were collected at each of the six surface-water and sediment sampling locations (C002 through C007). The data collected were compared to the monitoring guidelines and/or remediation goals (RGs) as described in Section 2.2.3 of the EMICY13 (USACE 2012).

The results of the surface-water and sediment sampling conducted in CWC demonstrated compliance with ARARs for the NC Sites.

GROUND-WATER MONITORING

Ground water was sampled during CY 2013 at the NC Sites following a protocol for individual wells and analytes and was analyzed for various radiological constituents and for inorganic parameters. Static ground-water elevations for all NC Site wells were measured quarterly.

The environmental sampling requirements and ground-water monitoring guidelines for each analyte are consistent with the EMICY13 (USACE 2012) and were used for comparison and discussion purposes. The ROD ground-water monitoring guidelines (i.e., ROD guidelines) for assessing ground-water sampling data at the NC Sites (Latty Avenue Properties and the SLAPS and SLAPS VPs) are presented in Section 2.2.4 of the EMICY13 (USACE 2012) and in Section 4.0 and Appendix F of this report. For those wells at which an analyte exceeded the ROD guidelines at least once during CY 2013 and sufficient data were available to evaluate trends, Mann-Kendall statistical trend analyses were completed to assess whether analyte concentrations were increasing or decreasing through time.

LATTY AVENUE PROPERTIES

Ground-water sampling was conducted at six hydrostratigraphic zone (HZ)-A ground-water monitoring wells at the Latty Avenue Properties during CY 2013. Five contaminants of concern (COCs), (arsenic in HW22, molybdenum in HISS-10 and HW22, U-234 and U-238 in HISS-01 and HISS-10, and total U in HISS-01) were above the ROD guidelines in HZ-A ground water at the Latty Avenue Properties during CY 2013. Because a significant degrading of CWC surface water has not occurred, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water. However, because arsenic, molybdenum, U-234, U-238, and total U levels have been above the ROD guidelines for a period of at least 12 months, monitoring will continue subject to subsequent 5-year reviews.

Ground-water samples were collected from one HZ-C well, HW23, during CY 2013. One analyte, U-234, was detected at concentrations above its ROD ground-water guideline in HZ-C ground water and has been detected above its ROD ground-water guideline for a period of at least 12 months. However, because the U-234 only slightly exceeds its ROD guideline (i.e., it is within 1 pCi/L when measurement error is taken into account) and the total U concentration is not above the monitoring guideline of 30 µg/L, no findings currently indicate significantly degraded ground-water conditions in HZ-C ground water. An evaluation of potential response actions is not required.

The Mann-Kendall trend test was performed for three COCs in three HZ-A wells (total U in HISS-01 and HISS-10, and arsenic and molybdenum in HW22) during CY 2013. The Mann-Kendall trend test resulted in a statistically significant increasing trend for arsenic and molybdenum in HW22. A statistically significant increasing trend was also identified for total U concentrations in HISS-01 and HISS-10. However, total U concentrations in HISS-01 have declined from a high of 337 micrograms per liter (µg/L) on May 29, 2009, to 56.5 µg/L on August 28, 2013. The total U concentrations at HISS-10 for this period have not exceeded the 30 µg/L monitoring guideline; and based on the time-versus-concentration plot (Figure 4-4), no significant trend in total U concentrations at HISS-10 exists when measurement error is taken into account. A trend analysis was not conducted for molybdenum in HISS-10, because the frequency of non-detect values in the dataset exceeds 50 percent.

A trend analysis was not conducted for U-234 in HZ-C well HW23, because the frequency of non-detected results exceeds 50 percent. Total U concentrations did not exceed the 30 µg/L monitoring guideline in this well; and based on the time-versus-concentration plot (Figure 4-4), no trend in total U concentrations at HW23 exists. Because the total U values are calculated using the U-234 and U-238 values, the trend in U-234 values at HW23 would be similar to the trend in Total U values (i.e., no trend). Therefore, based on the historical data and the time-versus-concentration plot, no significant changes in total U concentrations occurred in HZ-C ground water during CY 2013.

The potentiometric data indicate near-radial potentiometric surface contour patterns for the HZ-A ground water at the HISS and Futura. Wells HISS-10 and HW22 have the highest potentiometric surface elevations, with lower ground-water elevations measured in the surrounding wells. At the western edge of the site, ground water in the HZ-A zone flows to the west toward CWC.

The potentiometric surface of the HZ-C ground water at the Latty Avenue Properties is not well defined due to the limited data available for the deeper HZs. Based on measured ground-water elevations in the HZ-C monitoring well HW23 at the Latty Avenue Properties and several HZ-C wells located to the southwest at the SLAPS and SLAPS VPs, the flow direction in the HZ-C ground water is generally toward the east or northeast. The local horizontal gradient for HZ-C is low, ranging from 0.0029 ft/ft (May) to 0.0039 ft/ft (December) in CY 2013.

ST. LOUIS AIRPORT SITE AND ST. LOUIS AIRPORT SITE VICINITY PROPERTIES

At the SLAPS and SLAPS VPs, 13 ground-water wells were sampled for various parameters during CY 2013. Ten wells, screened in HZ-A, were sampled at the SLAPS and the adjacent ballfields. Three inorganic analytes (chromium, molybdenum, and nickel) and one radiological contaminant (total U) were detected in HZ-A ground water at concentrations above the ROD guidelines. A comparison of the data indicates that the chromium and nickel concentrations in B53W13S and the total U concentrations in PW46 have been above the ROD guideline for a period of at least 12 months. Because a significant degrading of CWC surface water has not occurred, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2013. However, because chromium, nickel, and total U levels have been above the ROD guidelines for a period of at least 12 months, monitoring will continue subject to subsequent 5-year reviews.

During CY 2013, three wells screened across the deeper HZs (HZ-C through HZ-E) were sampled at the SLAPS and SLAPS VPs. Comparison of the data to the ROD guideline indicates that nickel at B53W07D was detected at levels above the ROD guideline in HZ-C through HZ-E ground water. However, the nickel concentration at B53W07D did not exceed its ROD guideline if the associated measurement error is taken into account. Therefore, the CY 2013 HZ-C through HZ-E ground-water data from the SLAPS and SLAPS VPs indicate that significant degradation of lower ground water is not occurring.

The Mann-Kendall trend test was performed for chromium (B53W06S, B53W09S, B53W13S, and B53W18S), nickel (B53W13S), and total U (PW46). Statistically significant increasing trends were observed for nickel in B53W13S and for chromium in B53W06S, B53W09S, B53W13S, and B53W18S. No trend was observed for total U in PW46. Trend analysis was not performed for molybdenum in B53W13S and B53W18S, because molybdenum did not exceed the ROD guidelines if associated measurement errors were taken into account.

Potentiometric surface maps were created from ground-water elevations measured in May and December to illustrate ground-water flow conditions in wet and dry seasons, respectively. The potentiometric data indicated ground-water flow to the northwest toward CWC in the HZ-A at the SLAPS. The flow direction in the HZ-C ground water at the SLAPS is generally east to northeast.

1.0 HISTORICAL SITE BACKGROUND AND CURRENT SITE STATUS

1.1 INTRODUCTION

This Annual Environmental Monitoring Data and Analysis Report (EMDAR) for calendar year (CY) 2013 applies to the North St. Louis County (NC) Sites (Figure 1-1) within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This EMDAR provides an evaluation of the data collected as part of the implementation of the Environmental Monitoring Program (EMP) for the NC Sites within the FUSRAP. The NC Sites consist of the St. Louis Airport Site (SLAPS), its associated vicinity properties (VPs) (i.e., SLAPS VPs) (Figure 1-2), and the Latty Avenue Properties (Figure 1-3). The Latty Avenue Properties include the Futura Coatings Company (Futura), the Hazelwood Interim Storage Site (HISS), and the Latty Avenue VPs. Additional environmental data were collected along Coldwater Creek (CWC), which flows adjacent to the SLAPS and near the HISS. Environmental monitoring of various media at each of the NC Sites is required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and a commitment outlined in the Federal Facility Agreement (FFA).

1.2 PURPOSE

The purpose of this report is to document the environmental monitoring activities and to assess whether the remedial actions (RAs) being performed at the NC Sites could be having a measurable environmental impact. In addition, this report serves to enhance the reader's awareness of the current condition of the NC Sites, summarize the data collection efforts for CY 2013, and provide analysis of the CY 2013 environmental monitoring data results. This document presents the following information:

- Sample collection data for various media at each site and interpretation of CY 2013 EMP results;
- The compliance status of each site with federal and state applicable or relevant and appropriate requirements (ARARs) or other benchmarks (e.g., *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for CY 2013* [EMICY13] [USACE 2012]);
- Dose assessments for radiological contaminants as appropriate;
- A summary of trends based on changes in contaminant concentrations, to support RAs, ensure public safety, and maintain surveillance monitoring requirements at each site; and
- The identification of data gaps and future EMP needs.

1.3 ST. LOUIS SITE PROGRAM AND SITE BACKGROUND

The FUSRAP was executed by the U.S. Atomic Energy Commission (AEC) in 1974 to identify, remediate, or otherwise control sites at which residual radioactivity remains from operations conducted for the Manhattan Engineer District (MED) and AEC during the early years of the nation's atomic energy program. The FUSRAP was continued by the follow-on agencies to the AEC until 1997, when the U.S. Congress transferred responsibility for the FUSRAP to the U.S. Army Corps of Engineers (USACE).

On October 4, 1989, the SLAPS, the HISS, and Futura were placed on the *National Priorities List, St. Louis Airport/Hazelwood Interim Storage/FUTURA Coatings Co.* (NPL) (USEPA 1989a).

The three NPL sites have been involved with some of the following: refining of uranium ores, production of uranium metal and compounds, uranium recovery from residues and scrap, and the storage and disposal of associated process byproducts.

Detailed descriptions and histories for each site can be found in the *Remedial Investigation Report for the St. Louis Site* (DOE 1994), *Remedial Investigation Addendum for the St. Louis Site* (DOE 1995), *St. Louis Airport Site (SLAPS) Interim Action Engineering Evaluation/Cost Analysis (EE/CA)* (DOE 1997), *Engineering Evaluation/Cost Analysis (EE/CA) and Responsiveness Summary for the St. Louis Airport Site (SLAPS)* (USACE 1998a), *Environmental Evaluation/Cost Analysis (EE/CA) for the Hazelwood Interim Storage Site (HISS)* (USACE 1998b), the *Environmental Monitoring Guide for the St. Louis Sites* (EMG) (USACE 1999a), and the *Record of Decision for the North County Sites* (ROD) (USACE 2005.

During CY 2013, the following documents were finalized for the NC Sites:

- Field work variance (FWV)-204: Amended the restoration plan to reflect restoration of Area A-6 (modified the *Remedial Design/Remedial Action Work Description, Vicinity Properties 16 and Norfolk Southern/Eva Load-Out Facility, Supplement No. 13 to the FUSRAP Remedial Action Work Plan for the North St. Louis County Sites*) (January 31);
- *Addendum to the Pre-Design Investigation Summary Report for FUSRAP Coldwater Creek Vicinity Property 08(C) & Latty Avenue Vicinity Properties 01(L), & 40A East, & Parcel 10K53008* (February 28);
- *CY2012 Fourth Quarter Laboratory QA/QC Report for the FUSRAP St. Louis Radioanalytical Laboratory & Associated Satellite Laboratories* (February);
- *Vicinity Property 01(L) Building Interior Decontamination Plan, FUSRAP North St. Louis County Sites* (April 9);
- *CY2013 First Quarter Laboratory QA/QC Report for the FUSRAP St. Louis Radioanalytical Laboratory & Associated Satellite Laboratories* (May);
- FWV-205: Amended the decontamination plan to include the floor vaults in the Main Building (modified the *Vicinity Property 01(L) Building Interior Decontamination Plan, FUSRAP North St. Louis County Sites*) (May 13);
- *Sampling Plan For Investigation of Soil, Sediment, and Structures on the St. Louis Airport Site Vicinity Properties 09(C) and 10(C), the Right-Of-Way Adjacent to Byassee Drive (Partial), and the Coldwater Creek Corridor (Partial)* (May 23);
- *Pre-Design Investigation Work Plan for the St. Louis Airport Site Vicinity Properties 01, 02, 07, 13, 14, 15, and Investigation Area 11* (May 31);
- FWV-207: Amended the decontamination plan to include the conveyor track system in the Main Building and the drainage trenches in the Boiler House (modified the *Vicinity Property 01(L) Building Interior Decontamination Plan, FUSRAP North St. Louis County Sites*) (June 20);
- *Vicinity Properties Ballfields-Phase 2B Remedial Design Plan, Addendum 1 of the Remedial Design/Remedial Action Work Description, Vicinity Properties Ballfields-Phase 2, Supplement No. 14 to the FUSRAP Remedial Action Work Plan for the North St. Louis County Sites* (June 24);

- FWV-206: Amended the restoration plan to include restoration of the disturbed areas of A-8 with rock to be consistent with the pre-existing surface (modified the *Remedial Design/Remedial Action Work Description, Vicinity Properties 16 and Norfolk Southern/Eva Load-Out Facility, Supplement No. 13 to the FUSRAP Remedial Action Work Plan for the North St. Louis County Sites)* (July 3);
- *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2012* (July 19);
- *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);
- FWV-011: Amended Appendix A, Site Safety and Health Plan, to clarify vehicle/equipment inspection frequency and incorporate visitor policy requirements (modified the *Accident Prevention Plan, St. Louis FUSRAP Sites)* (August 1);
- *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for Vicinity Property 40A (partial)* (August 13);
- *CY2013 Second Quarter Laboratory QA/QC Report for the FUSRAP St. Louis Radioanalytical Laboratory & Associated Satellite Laboratories* (September);
- *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 10, 11, and 12* (September 5);
- *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property 31A* (September 18);
- *Pre-Design Investigation Summary Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Properties 09C, 10C, and the Road Right-of-Way (partial)* (September 18);
- *Post-Remedial Action Report and Final Status Survey Evaluation for the Latty Avenue Vicinity Property Hazelwood Interim Storage Site* (September 25);
- *Post-Remedial Action Report and Final Status Survey Evaluation for the St. Louis Airport Site Vicinity Property Investigation Area 13 Airport Authority* (September 27);
- FWV-012: Amended to update acronyms, the procedure to follow in case of a power outage in Section 2.4, the primary and alternate site contacts at the St. Louis FUSRAP Sites in Appendix B, and the Utility Contact List in Appendix C (modified the *St. Louis FUSRAP Sites On-Call Book [Guide to After-Hours Monitoring], St. Louis FUSRAP Sites)* (September 30);
- *CY2013 Third Quarter Laboratory QA/QC Report for the FUSRAP St. Louis Radioanalytical Laboratory & Associated Satellite Laboratories* (November); and
- *Environmental Monitoring Implementation Plan for the North St. Louis County Sites for Calendar Year 2014* (December 27).

1.3.1 Latty Avenue Properties Calendar Year 2013 Remedial Actions

During CY 2013, RAs were performed inside the Futura buildings and the VP-01(L) buildings at the Latty Avenue Properties (Figure 1-3). Remedial activities inside the Futura buildings continued from CY 2012 into and were completed in the first quarter. Remedial activities inside the VP-01(L) buildings began in the first quarter and continued through and were completed in the third quarter. The contaminated materials remediated as a result of the RA at the Latty Avenue Properties during CY 2013 totaled 83 cubic yards (yd^3) (63 cubic meters [m^3]). All of the contaminated materials were shipped via railcar to US Ecology of Idaho for proper disposal.

During CY 2013, *Multi-Agency Radiation Survey and Site Investigation (MARSSIM)* (DOD 2000) Class 1 verifications were performed inside the Futura buildings and the VP-01(L) buildings. Verifications at the Latty Avenue Properties were performed to confirm the ROD remediation goals (RGs) were achieved. MARSSIM Class 2 verifications were performed inside the VP-01(L) buildings and in the VP-01(L) right-of-way (ROW).

During CY 2013, characterizations/pre-design investigations (PDIs) were performed at the VP-01(L) buildings and in the VP-01(L) ROW.

1.3.2 St. Louis Airport Site and St. Louis Airport Site Vicinity Properties Calendar Year 2013 Remedial Actions

During CY 2013, RAs were performed at the following SLAPS-related investigation areas (IAs) and VPs (Figure 1-2): IA-09 (Ballfields) Phase 2, Ballfields Phase 2B, and VP-16. Excavation activities at the Ballfields Phase 2 continued throughout the year and were completed in the fourth quarter. Excavation activities at the Ballfields Phase 2B began in the second quarter and continued throughout the remainder of the year. Excavation activities at VP-16 continued into the first quarter and were completed in the second quarter. Restoration activities at VP-16 were completed in the third quarter. Approximately 6,044 yd^3 (4,621 m^3) of contaminated materials were removed from the SLAPS IAs and VPs and were shipped via railcar to US Ecology of Idaho.

During CY 2013, MARSSIM Class 1 verifications were performed at the Ballfields (survey unit [SU]-8 through SU-10), and VP-16 (SU-1 and SU-3) to confirm that ROD RGs were achieved. No MARSSIM Class 2 and 3 verifications were performed.

During CY 2013, characterizations/PDIs were performed at the following SLAPS VPs: VP-09(C); VP-10(C); the Road ROW; the CWC Corridor, CWC Reach A; CWC from Frost Avenue to St. Denis Bridge; VPs 1, 2, 7, 13, 14, and 15; IA-10; IA-11; and Byassee Road and adjacent properties.

During CY 2013, no Resource Conservation and Recovery Act (RCRA) hazardous waste was shipped, and no monitoring wells were decommissioned.

In accordance with the Metropolitan St. Louis Sewer District (MSD) authorization letter, 1,210,380 gallons of excavation water were discharged from the NC Sites in CY 2013. Since the beginning of the project, 26,111,178 gallons have been treated and released to MSD from the NC Sites.

2.0 EVALUATION OF RADIOLOGICAL AIR MONITORING DATA

This section documents environmental monitoring activities related to radiological air data. The radiological air measurements conducted at the NC Sites are part of the EMP. Radiological air data is collected to evaluate the compliance status of each site with ARARs, to evaluate trends, and to perform dose assessments for radiological contaminants as appropriate at each site. Section 2.1 includes a description of the types of radiological measurements conducted at the NC Sites, potential sources of the contaminants to be measured (including natural background), and measurement techniques employed during CY 2013.

All radiological air monitoring required through implementation of the EMICY13 (USACE 2012) was conducted as planned during CY 2013. The evaluations of radiological air monitoring data for all NC Sites demonstrated compliance with ARARs.

A total effective dose equivalent (TEDE) for the reasonably maximally exposed (RME) member of the public was calculated for the Latty Avenue Properties, the SLAPS, and the SLAPS VPs by summing the dose due to gamma radiation, radiological air particulates, and radon. The TEDE calculated for the reasonably maximally exposed individual at the Latty Avenue Properties, the SLAPS, and the SLAPS VPs were all less than 0.1 millirem per year (mrem/yr) (0.001 millisievert per year [mSv/yr]). These calculated TEDEs are compliant with the 100 mrem/yr (1 mSv/yr) limit provided in 10 *Code of Federal Regulations (CFR)* 20.1301. Details of the radiological dose assessment (TEDE calculation) are presented in Section 6.0.

2.1 RADIOLOGICAL AIR MEASUREMENTS

The three types of radiological air monitoring that were conducted at the NC Sites during CY 2013 are gamma radiation, airborne radioactive particulates, and airborne radon. Sections 2.2 and 2.3 provide details of the air monitoring conducted at the Latty Avenue Properties and the SLAPS and SLAPS VPs, respectively.

2.1.1 Gamma Radiation

Gamma radiation is emitted from natural, cosmic, and manmade sources. The earth naturally contains gamma radiation-emitting substances, such as the uranium decay series, the thorium decay series, and potassium-40. Cosmic radiation originates in outer space and filters through the atmosphere to the earth. Together, these two sources make up the majority of natural gamma background radiation. The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimates that the total naturally occurring background radiation dose equivalent due to gamma exposure is 65 mrem/yr (0.65 mSv/yr), 35 mrem/yr (0.35 mSv/yr) of which originates from sources on earth and 30 mrem/yr (0.3 mSv/yr) of which originates from cosmic sources (UNSCEAR 1982). The background monitoring locations for the NC Sites (Figure 2-1) are reasonably representative of background gamma radiation for the St. Louis metropolitan area.

Gamma radiation was measured at the NC Sites during CY 2013 using thermoluminescent dosimeters (TLDs). TLDs were located at site boundaries in order to provide input for calculation of TEDE.

The TLDs were placed at the monitoring location approximately 3 feet (ft) (0.9 meter [m]) above the ground surface inside a housing shelter. The TLDs were collected quarterly and sent to a properly certified, off-site laboratory for analysis.

2.1.2 Airborne Radioactive Particulates

2.1.2.1 Air Sampling

Airborne radioactive particulates result from radionuclides in soil that become suspended in the air. The radionuclides in soil normally become airborne as a result of wind erosion of the surface soil or as a result of the soil being disturbed (e.g., excavation). This airborne radioactive material includes naturally occurring background concentrations, as well as above background concentrations of radioactive materials present at the NC Sites.

Airborne radioactive particulates were measured at the NC Sites 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 (i.e., microcurie per milliliter [µCi/mL]). Particulate air monitors were located at excavation and loadout area perimeter locations, as appropriate to provide input for the National Emissions Standards for Hazardous Air Pollutants (NESHAP) Report and calculation of TEDE to the critical receptor. Air particulate samples were typically collected weekly or at more frequent intervals.

2.1.2.2 Estimation of Emissions in Accordance with the National Emission Standard for Hazardous Air Pollutants

The NC Sites CY 2013 NESHAP Report (provided as Appendix A) presents the calculation of the effective dose equivalent (EDE) from radionuclide emissions to critical receptors in accordance with the NESHAP. The report is prepared in accordance with the requirements and procedures contained in 40 *CFR* 61, Subpart I.

Emission rates calculated using air sampling data, activity fractions, and other site-specific information were used for the NC Sites as inputs to the U.S. Environmental Protection Agency (USEPA) CAP88-PC Version 3.0 modeling code (USEPA 2007) to demonstrate compliance with the 10 mrem/yr ARAR in 40 *CFR* 61, Subpart I.

2.1.3 Airborne Radon

Uranium (U)-238 is a naturally occurring radionuclide that is commonly found in soil and rock. Radon (Rn)-222 is a naturally occurring radioactive gas found in the uranium decay series. A fraction of the radon produced from the radioactive decay of naturally occurring U-238 diffuses from soil and rock into the atmosphere, accounting for natural background airborne radon concentrations. In addition to this natural source, radon is produced from the above background concentrations of radioactive materials present at the NC Sites.

Outdoor airborne radon concentration is governed by the emission rate and dilution factors, both of which are strongly affected by meteorological conditions. Surface soil is the largest source of radon. Secondary contributors include oceans, natural gas, geothermal fluids, volcanic gases, ventilation from caves and mines, and coal combustion. Radon levels in the atmosphere have been observed to vary with height above the ground, season, time of day, and location. The chief meteorological parameter governing airborne radon concentration is atmospheric stability; however, the largest variations in atmospheric radon occur spatially (USEPA 1987).

Radon alpha track detectors (ATDs) were used at the NC Sites to measure alpha particles emitted from radon and its associated decay products. Radon ATDs were co-located with environmental

TLDs approximately 3 ft (0.9 m) above the ground surface in housing shelters at the site boundaries or at locations representative of areas accessible to the public. Outdoor ATDs were collected approximately every 6 months and sent to an off-site laboratory for analysis. Recorded radon concentrations are listed in picocuries per liter (pCi/L) and are used to provide input for calculation of TEDE.

At the NC Sites, ATDs were also placed in locations within applicable structures to monitor for indoor radon exposure. The ATDs were located in areas that represent the highest likely exposure from indoor radon. ATD locations were chosen with consideration given to known radium (Ra)-226 concentrations under applicable buildings and occupancy time 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 working levels (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.

The NC Sites were in compliance with the 0.02 WL ARAR in 40 *CFR* 192.12(b). Results from CY 2013 demonstrating compliance are discussed in Section 2.2.4.

2.2 LATTY AVENUE PROPERTIES

For CY 2013, radiological air monitoring was only conducted at Futura.

2.2.1 Evaluation of Gamma Radiation Data

Because cleanup activities at the HISS and Futura (the remaining Latty Avenue Properties with the highest levels of residual contamination) were completed in CY 2011, external gamma radiation exposure from Latty Avenue Properties is considered negligible. Therefore, environmental TLD monitoring was not conducted at Latty Avenue Properties in CY 2013.

2.2.2 Evaluation of Airborne Radioactive Particulate Data

No excavation or loadout activities for the Latty Avenue Properties occurred in CY 2013. Therefore, radioactive particulate emissions were considered negligible, and air sampling for particulate radionuclides was not required.

2.2.3 Evaluation of Outdoor Airborne Radon Data

Because cleanup activities at the HISS and Futura were completed in CY 2011, outdoor exposure from Rn-222 from Latty Avenue Properties was considered negligible in CY 2013. Therefore, outdoor environmental Rn-222 monitoring was not conducted at Latty Avenue Properties.

2.2.4 Evaluation of Indoor Airborne Radon Data

Indoor radon monitoring was performed at Futura buildings using ATDs placed at several locations in each Futura building at a height of 4 ft (1.2 m) (to approximate breathing zone conditions) to measure radon concentrations. The detectors were located as shown on Figure 2-2. The ATDs were installed in January of CY 2013 at each monitoring location, collected for analysis after approximately 6 months of exposure, and replaced with another set that represent radon exposure for the rest of the year. Recorded radon concentrations (listed in pCi/L) were converted to radon WLs and an indoor radon equilibrium factor of 0.4 (NCRP 1988) was applied.

The results (including background) were evaluated based on the criteria contained in 40 *CFR* 192.12(b). The average annual radon concentration was determined to be less than the 40 *CFR* 192.12(b) criterion of 0.02 WL in each building (Leidos 2014a). Additional details of the data and calculation methodology used to determine indoor radon WLs in the Futura buildings are located in Table 2-1. Indoor ATD data is located in Appendix B, Table B-4, of this report.

Table 2-1. Summary of Futura Indoor Airborne Radon (Rn-222) Data for CY 2013

Monitoring Location	Monitoring Station	Average Annual Concentration				
		01/07/13 to 07/09/13[a] (pCi/L)	07/09/13 to 01/10/14[a] (pCi/L)	Annual Average (pCi/L)[b]	Building Average (pCi/L)[c]	WL[d]
Futura Building	HF-1	1.6	1.3	1.45	**2.13**	**0.009**
	HF-2	4.4	4.5	4.45		
	HF-3	0.7	0.3	0.50		
Futura Building 2/3	HF-4	0.6[e]	0.6	0.60	**0.63**	**0.003**
	HF-5	0.5[e]	0.5	0.50		
	HF-6	0.6	0.4	0.50		
	HF-7	0.9	0.9	0.90		
Futura Building 4	HF-8	0.7	0.9	0.80	**0.80**	**0.003**
	HF-9	0.7	0.9	0.80		
	HF-10	0.7	0.9	0.80		

[a] Detectors were installed and removed on the dates listed. Data are as reported from the vendor.
[b] Results reported from the vendor for two periods are averaged to estimate an annual average radon concentration (in pCi/L) above background.
[c] In each building, the average annual result for each monitoring station within the building was used to calculate a building average.
[d] 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)).
[e] The first semi-annual ATDs at station HF-4 and HF-5 were lost and could not be collected. First semi-annual results assumed to be equal to the second semi-annual results for both locations.

2.3 SLAPS AND SLAPS VICINITY PROPERTIES

For CY 2013, radiological air monitoring was conducted at the Ballfields, VP-16, and the SLAPS.

2.3.1 Evaluation of Gamma Radiation Data

External gamma radiation exposure from the SLAPS VPs is considered negligible; therefore, environmental TLD monitoring was not conducted. Gamma radiation monitoring was performed at the SLAPS during CY 2013 at four site locations surrounding the loadout area (Figure 2-3) and at the background location to compare on-site/off-site exposure and to provide input for calculation of TEDE to the critical receptor (Section 6.0). The EMP uses two TLDs at Monitoring Station PA-2 (for each monitoring period) to provide additional quality control (QC) of the monitoring data.

A summary of TLD monitoring results for CY 2013 at the SLAPS is shown in Table 2-2. TLD data is located in Appendix B, Table B-3, of this report.

Table 2-2. Summary of SLAPS Gamma Radiation Data for CY 2013

Monitoring Location	Monitoring Station	First Quarter TLD Data (mrem/qtr) Rpt./Cor.		Second Quarter TLD Data (mrem/qtr) Rpt./Cor.		Third Quarter TLD Data (mrem/qtr) Rpt./Cor.		Fourth Quarter TLD Data (mrem/qtr) Rpt./Cor.		CY 2013 Net TLD Data (mrem/yr)
		Rpt.	Cor.[a,b]	Rpt.	Cor.[a,b]	Rpt.	Cor.[a,b]	Rpt.	Cor.[a,b]	
SLAPS Perimeter	PA-1	0.6	0.7	0.8	0.8	0.0	0.0	0.0	0.0	1
	PA-2	1.6	1.9	5.4	5.4	0.0	0.0	3.3	3.3	11
	PA-2[c]	2.7	3.1	3.2	3.2	0.0	0.0	3.6	3.6	---
	PA-3	0.0	0.0	0.9	0.9	0.0	0.0	0.0	0.0	1
	PA-4	1.3	1.5	3.0	3.0	0.0	0.0	1.3	1.3	6
Background	BA-1	18.3	---	18.9	---	22	---	21.1	---	20.1

[a] All quarterly data reported from the vendor have been normalized to exactly one quarter's exposure.
[b] CY 2013 net TLD data are corrected for background, shelter absorption (s/a = 1.075), and fade.
[c] A QC duplicate is collected at the same time and location and is analyzed by the same method for evaluating precision in sampling and analysis. Duplicate sample results were not included in calculations.
--- Result calculations not required.
Cor. – Corrected
mrem/qtr – millirem per quarter
Rpt. – Reported

2.3.2 Evaluation of Airborne Radioactive Particulate Data

For the SLAPS and SLAPS VPs, air sampling for particulate radionuclides was conducted at the perimeter of each active excavation and loadout area throughout the year. Air particulate data was used as inputs to the NESHAP Report (Appendix A) and calculation of TEDE to the critical receptor (Section 6.0).

A summary of air particulate monitoring data for the SLAPS and SLAPS VPs is shown in Table 2-3. Airborne radioactive particulate data is located in Appendix B, Table B-2, of this report.

Table 2-3. Summary of SLAPS Airborne Radioactive Particulate Data for CY 2013

Monitoring Station	Average Concentration (µCi/mL)[a]	
	Gross Alpha	Gross Beta
Ballfields	5.12E-15	3.52E-14
VP-16	2.30E-15	1.67E-14
SLAPS Loadout	3.65E-15	3.22E-14
Background Concentration[b]	3.68E-15	2.06E-14

[a] Average concentration values for the sampling period by location.
[b] These concentrations are only provided for informational purposes.

2.3.3 Evaluation of Outdoor Airborne Radon Data

Exposure from Rn-222 from the SLAPS VPs is considered negligible; therefore, outdoor environmental Rn-222 monitoring was not conducted. Outdoor airborne radon monitoring was performed at the SLAPS using ATDs placed around the loadout area to measure radon emissions from the site. Four detectors were co-located with TLDs, as identified on Figure 2-3. One additional detector was located at Monitoring Station PA-2 as a QC duplicate. A background ATD was used to compare on-site exposure and off-site background exposure. Outdoor airborne radon data was used as an input for calculation of TEDE to the critical receptor (Section 6.0).

A summary of CY 2013 outdoor radon data at the SLAPS is shown in Table 2-4. Outdoor ATD data is located in Appendix B, Table B-4, of this report.

Table 2-4. Summary of SLAPS Outdoor Airborne Radon (Rn-222) Data for CY 2013

Monitoring Location	Monitoring Station	Average Annual Concentration (pCi/L)		
		01/07/13 to 07/09/13 [a] (Uncorrected)	07/09/13 to 01/10/14[a] (Uncorrected)	Average Annual Concentration[b]
SLAPS Perimeter	PA-1	0.2	0.2	0.00
	PA-2	0.2	0.2	0.00
	PA-2[c]	0.2	0.2	---
	PA-3	0.2	0.2	0.00
	PA-4	0.2	0.2	0.00
Background	BA-1	0.2	0.2	---

[a] Detectors were installed and removed on the dates listed. Data are as reported from the vendor (gross data including background).
[b] Results reported from vendor for two periods are time-weighted and averaged to estimate an annual average radon concentration (pCi/L) above background.
[c] A QC duplicate is collected at the same time and location, and is analyzed by the same method for evaluating precision in sampling and analysis.
--- Result calculation not required.

3.0 EVALUATION OF EXCAVATION-WATER, STORM-WATER, SURFACE-WATER, AND SEDIMENT MONITORING DATA

This section provides a description of the excavation-water, storm-water, surface-water, and sediment monitoring activities conducted at the NC Sites, including the monitoring of CWC during CY 2013. The results obtained from these monitoring activities are presented and evaluated with respect to historical data and the appropriate discharge limits as described in the EMICY13 (USACE 2012).

Section 2.2.2 of the EMICY13 for the NC Sites outlines the discharge limits for the storm-water and excavation-water discharged at each site (USACE 2012). The MSD has issued discharge authorization letters for the NC Sites that established discharge-limit-based criteria (MSD 1998, 2001, 2006, 2008, 2010, and 2012a). The pollutants addressed for all NC Sites are identified in Table 2-5 of the EMICY13 (USACE 2012). The pollutants addressed in the National Pollutant Discharge Elimination System (NPDES) permit equivalent for the SLAPS will be applied at all NC Sites and are identified in Table 2-6 of the EMICY13 (USACE 2012). For cases in which the regulatory authorities have not provided radiological contaminant of concern (COC) discharge limits, the 10 *CFR* 20, Appendix B water effluent values are used to calculate the sum of ratios (SOR) value for each discharge. Additionally, the SOR aids in the establishment of water management protocols. The Missouri Department of Natural Resources (MDNR) has also issued an ARAR document outlining limits for the storm-water outfalls at the SLAPS (MDNR 1998).

3.1 EXCAVATION-WATER AND STORM-WATER DISCHARGE MONITORING

This section provides a description of the excavation-water and storm-water monitoring activities conducted at the NC Sites during CY 2013. The monitoring results obtained from these activities are presented and compared with the various authorization letters or permit-equivalent limits as presented in the EMICY13 (USACE 2012). The purpose of storm-water and excavation-water discharge sampling at the NC Sites is to maintain compliance with the specific discharge requirements for each respective site.

3.1.1 Metropolitan St. Louis Sewer District Special Discharge Approval for the Hazelwood Interim Storage Site On-Site Radioanalytical Laboratory

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 approval. The laboratory waste-water is discharged to MSD manhole 10K2-075S, which is shown on Figure 3-1. The MSD special discharge approval requires compliance with applicable discharge regulations (Ordinance 8472) (MSD 1991). The current special discharge approval extension was renewed on January 31, 2012, and expires February 7, 2014 (MSD 2012b).

3.1.2 Evaluation of Storm-Water Discharge Monitoring Results

During CY 2013, storm-water sampling at the SLAPS was conducted to verify compliance with NPDES permit-equivalent requirements. There is one NPDES outfall located at the SLAPS. This outfall has been assigned the station identification PN02 for Outfall 002. PN02 is located at the termination of a drainage feature that conveys storm water along the north side of McDonnell Boulevard to CWC (Figure 3-2).

In conjunction with the construction of a sedimentation basin during CY 1998, the MDNR issued discharge sampling requirements for three outfalls (PN01 [now terminated], PN02, and PN03 [now terminated]). The ARAR permit-equivalent document (MDNR 1998) requires monthly monitoring for flow, oil and grease, total petroleum hydrocarbons (TPHs), pH, settleable solids (SS), and polychlorinated biphenyls, as well as total recoverable arsenic, chromium, and cadmium. In addition, effluent monitoring for gross alpha, gross beta, protactinium (Pa)-231, actinium (Ac)-227, total Ra, total thorium (Th), and total U is required for each discharge event. Effluent monitoring for radon is required twice per year. As outlined in a letter from the USACE to the MDNR dated November 18, 2003, chemical oxygen demand monitoring (COD) has been modified from quarterly to annually (USACE 2003). Effluent monitoring for radon was not performed in CY 2013, because no pumping occurred from the active excavation areas and the second quarter sample from Outfall 002 had short holding time requirements.

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 of 2002 until the drainage area becomes affected by soil disturbance such as excavation (MDNR 2002). The condition of the agreement is that the MDNR be notified prior to the soil in the area being disturbed. The USACE increased the sampling frequency from annually (MDNR 2002) to monthly at Outfall 002 (PN02), as established in the original permit equivalent agreement, as of November 26, 2013.

During 2013, no un-named moving pumping outfalls were utilized during excavation activities for the management of storm water with regard to sediment control and pumped excavation water. Moving outfalls are necessary to pump excess excavation water, which cannot be contained due to geographic conditions, to CWC. The un-named excess excavation water is pumped to CWC in accordance with agreements made during a March 12, 2007, meeting with Mr. Tom Siegel of the MDNR, and as described in a subsequent letter from the USACE dated April 20, 2007 (USACE 2007). The excavation water sampling is conducted to verify compliance with the NPDES permit-equivalent requirements. The discharge parameters for the un-named outfalls follow the same NPDES parameters as Outfall 002.

Analytical results for the NC Sites are presented in Appendix C, Table C-1. Quarterly summaries of the CY 2013 storm-water monitoring events for the NC Sites are presented in the following subsections. NC Sites storm-water monitoring results for CY 2013 are presented in Table 3-1.

During CY 2013, rainfall data was obtained from the National Weather Service Station at Lambert – St. Louis International Airport, which is adjacent to the NC Sites. Daily flow and rainfall data are included in Appendix C, Table C-2.

<u>First Quarter</u>

During the first quarter (January, February, and March) of CY 2013, no outfalls were sampled, because no measurable increase occurred in discharge rate from a precipitation event producing 0.1 inch (0.3 centimeter [cm]) or more of liquid in a 24-hour period.

<u>Second Quarter</u>

During the second quarter (April, May, and June) of CY 2013, all NPDES sample results were in compliance with permit-equivalent requirements (Table 3-1). Samples were collected when flow permitted. One sampling event was conducted at Outfall 002 during the second quarter.

<u>Third Quarter</u>

During the third quarter (July, August, and September) of CY 2013, no outfalls were sampled, because no measurable increase occurred in discharge rate from a precipitation event producing 0.1 inch (0.3 cm) or more of liquid in a 24-hour period.

Fourth Quarter

During the fourth quarter (October, November, and December) of CY 2013, no outfalls were sampled, because no measurable increase occurred in discharge rate from a precipitation event producing 0.1 inch (0.3 cm) or more of liquid in a 24-hour period.

Table 3-1. Second Quarter CY 2013 NPDES Sampling Events[a,b]

Monitoring Parameter	Final Effluent Limitations			Analytical Results		
				Outfall 002 Results		
				Chemical Parameters		
	Daily Maximum	Monthly Average	Units	April	May	June
Flow	Monitor only	Monitor only	MGD	0.401	[b]	[b]
Oil and Grease	15	10	mg/L	non-detect	[b]	[b]
TPHs	10	10	mg/L	non-detect	[b]	[b]
pH-Units	6.0-9.0	NA	SU	7.06	[b]	[b]
COD[c]	120	90	mg/L	24	[b]	[b]
SS[d]	1.5	1	mL/L/hr	non-detect	[b]	[b]
Arsenic, Total Recoverable	100	100	µg/L	2.1	[b]	[b]
Lead, Total Recoverable[e]	190	190	µg/L	[e]	[b]	[b]
Chromium, Total Recoverable	280	280	µg/L	4.5	[b]	[b]
Copper, Total Recoverable[e]	84	84	µg/L	[e]	[b]	[b]
Cadmium, Total Recoverable	94	94	µg/L	0.12	[b]	[b]
Polychlorinated Biphenyls[f]	No release	No release	µg/L	non-detect	[b]	[b]
Event Sampling Date				Radiological Parameters[g,h]		
				Event 1		
				4/18/13		
Total U[i,j]	Monitor only	Monitor only	µg/L	1.E+00		
Total Ra[i,j]	Monitor only	Monitor only	µg/L	1.E-07		
Total Th[i,j]	Monitor only	Monitor only	µg/L	1.E+00		
Gross Alpha[i]	Monitor only	Monitor only	pCi/L	2.E+00		
Gross Beta[i]	Monitor only	Monitor only	pCi/L	1.E+00		
Pa-231[i]	Monitor only	Monitor only	pCi/L	1.E+00		
Ac-227[i]	Monitor only	Monitor only	pCi/L	0.E+00		
Radon[k]	Monitor only	Monitor only	pCi/L	[l]		

[a] A rainfall event is defined as a measurable increase in discharge rate from precipitation producing 0.1 inch (0.3 cm) or more of liquid in a 24-hour period that may also exceed the duration of 24 hours, and two events experienced within 48 hours may be reported together.
[b] Per the MDNR letter dated 02/19/02, sampling at Outfall 002 has been reduced to once a year (MDNR 2002).
[c] Per the USACE letter dated 11/18/03, the COD sampling requirement has been reduced from quarterly to annual sampling (USACE 2003).
[d] Detection Limit (DL) = 0.1 mL/L/hr
[e] Lead and copper sampling no longer necessary per the ROD.
[f] DL = 0.5 µg/L
[g] Value reported is based on a volume-weighted average of analyte activity concentrations for samples collected during the defined event. Corresponding radiological samples were collected on the same date as chemical samples; however, the radiological results are incorporated into the volume-weighted average for the specified event.
[h] Ra-228 and Th-228 are assumed to be in secular equilibrium with Th-232; therefore, Th-232 results are used to estimate Ra-228 and Th-228 values.
[i] As specified in the permit-equivalent, radionuclides require monitoring only, and limits are not permit specified.
[j] Total nuclide values (in µg/L units) were calculated using the activity concentration values reported by the laboratory and values for specific activity listed in Table 8.4.1 of *The Health Physics and Radiological Health Handbook* (Shleien 1992).
[k] Semi-annual reporting requirement only.
[l] The Outfall 002 samples were delivered to the lab on 04/19/13; because of short holding time requirements, the samples were not analyzed for radon.

NA – not applicable
µg/L – micrograms per liter
MGD – million gallons per day
mg/L – milligrams per liter
mL/L/hr – milliliter per liter per hour

3.1.3 Evaluation of Excavation-Water Monitoring Results at the North St. Louis County Sites

On July 23, 2001, the MSD conditionally approved the discharge of treated excavation water to an MSD sanitary sewer manhole located at the SLAPS (MSD 2001). The current extension to the special discharge approval expires on July 23, 2014 (MSD 2012a). The primary condition of the approval requires a treatment system be installed, maintained, and operated to produce an effluent meeting the following standards: MSD ordinances 8472, 10177, and 10082 (MSD 1991, 1994, 1997); the Nuclear Regulatory Commission (NRC) requirements in 10 *CFR* 20, Appendix B; and the Missouri Department of Health and Senior Services (DHSS) requirements in 19 *Code of State Regulations (CSR)* 20-10. In addition, the MSD limits the annual allocation for radioactivity from the NC Sites to the MSD CWC treatment plant. The MSD establishes the maximum volume of excavation water allowed to be discharged in a 24-hour period and requires that the analytical results of the treated excavation water comply with applicable standards and limits prior to discharge. The evaluation of monitoring data results demonstrate that all ARARs have been met. The selenium discharge variance for the SLAPS was not utilized in CY 2013 (MSD 2005, 2008, 2010, 2012a). There is no longer a requirement to analyze for barium, lead, and selenium after the first two batches from new investigative areas (MSD 2012a). Analytical results of the treated water are presented in Appendix C, Table C-3.

During CY 2013, approximately 1,210,380 gallons of treated excavation water from eight treatment batches were released to MSD manhole 10L3-043S (Table 3-2). The discharge location is illustrated on Figure 3-2. Batches of treated excavation water were sampled and analyzed for MSD effluent criteria (Appendix C, Table C-3).

Table 3-2. Excavation Water Discharged at the NC Sites During CY 2013

Quarter	Number of Discharges	Number of Gallons Discharged[a]	Total Activity (Curies [Ci])		
			Thorium[b]	Uranium (KPA)[c]	Radium[d]
1	2	503,419	5.38E-06	2.64E-05	2.82E-06
2	3	478,389	6.16E-06	8.45E-06	2.77E-06
3	2	178,149	2.10E-06	2.48E-06	1.06E-06
4	1	50,423	2.46E-07	6.02E-06	2.80E-07
Total	8	1,210,380	1.39E-05	4.34E-05	6.93E-06

[a] Quantities based on actual quarterly discharges from NC Sites.
[b] Calculated value based on the addition of isotopic analyses: Th-228 and Th-230.
[c] Value based on total U results (kinetic phosphorescence analysis [KPA]).
[d] Calculated value based on the addition of isotopic analyses: Ra-226 and Ra-228.

3.2 COLDWATER CREEK MONITORING

RA monitoring of surface water and sediment in CWC is required until the creek has been remediated. The purpose of the monitoring is to document that RAs are having a positive effect on the creek and to provide additional data to assess whether CWC is being measurably affected by COC migration from hydrostratigraphic zone (HZ)-A.

The EMP for CWC evaluates the water quality and the radiological and chemical parameters present in the surface water and sediment. Surface water and sediment are monitored for the radiological and chemical parameters in specified List 2 of Table 3-3 of the EMICY13 (USACE 2012). The water quality parameters are measured for surface water only.

The water quality parameters measured include pH, temperature, dissolved oxygen (DO), specific conductivity, oxidation reduction potential (ORP), and turbidity. The objectives of the EMP are:

- to assess the quality of surface water and sediment in CWC;
- to compare the results with monitoring guidelines and/or ROD RGs as established for these media in the EMICY13 (USACE 2012); and,
- to evaluate/determine whether runoff from the SLAPS, the HISS, the SLAPS VPs, and the Latty Avenue Properties affect the quality of surface water and sediment in CWC.

The MDNR has designated CWC as a metropolitan no-discharge stream. Therefore, discharges are prohibited, except as specifically permitted under the water quality standard, 10 *CSR* 20-7.031 and non-contaminated storm-water flows (10 *CSR* 20-7.015.1.A.4). CWC, from its mouth at the Missouri River to its crossing with U.S. Highway 67 (Lindbergh Boulevard) (a distance of roughly 5.5 miles), is a Class C stream. Class C streams may cease flow during dry periods but maintain permanent pools that support aquatic life (10 *CSR* 20-7.031.1.F.6). The upper reach of CWC south of U.S. Highway 67, which includes the SLAPS/HISS reach, is an unclassified water of the state.

Surface-water and sediment samples are collected from CWC on a semi-annual basis as part of the EMP (USACE 2012). The sampling events are conducted at six CWC monitoring stations (C002 through C007). Locations of the six monitoring stations are shown on Figure 3-3. Monitoring station C004, located between the SLAPS and the HISS, is used to monitor the potential water quality impacts from the SLAPS to CWC. Monitoring Station C005 is used to monitor water quality downstream from the HISS and those VPs located around Latty Avenue. Monitoring station C007, located approximately 3,700 ft (1,128 m) downstream of the HISS, is the farthest downstream monitoring station on CWC.

Note that other non-FUSRAP industrial discharges are relatively common along the sampled reaches of CWC; and therefore, sample parameters could be influenced by existing industrial sources other than former MED/AEC operations.

3.2.1 Coldwater Creek Surface-Water Monitoring Results

Sampling of surface water at CWC was conducted at or below base flow elevation during the months of April and October in 2013. The base flow elevation for CWC at the McDonnell Boulevard Bridge is 508.2 ft (154.9 m) above mean sea level (amsl). The base flow also may be approximated by a depth measurement of 3.2 ft (0.98 m) or less at an “average cross section.” CWC surface-water monitoring included determining water quality parameters, as well as obtaining samples for metals and radionuclides as listed in Table 3-3 of the EMICY13 (USACE 2012). Grab samples were collected and analyzed according to the protocol defined in the *Sampling and Analysis Guide for the St. Louis Sites* (SAG) (USACE 2000). In addition, isotopic U results were used to evaluate total U concentrations in surface water for comparison to the 30 micrograms per liter (µg/L) monitoring guide described in the ROD (USACE 2005).

All surface-water monitoring required through implementation of the EMICY13 was conducted as planned during CY 2013 (USACE 2012). The evaluation of monitoring data demonstrates that all applicable ARARs have been met. The sample results are presented in Appendix D, Table D-1, of this report.

<u>Water Quality Parameters</u>

Water quality data are collected as part of the routine performance of surface-water sampling and are used as part of the overall evaluation of water quality. The water quality results for each surface-water monitoring station are summarized in Table 3-3. The average surface-water temperatures during the April and October sampling events were 7.75 and 16.45 degrees Celsius (°C), respectively. The average surface-water pH values were 6.47 and 5.92, respectively. The average pH value for the April sampling event was within the acceptable range (6.0 to 9.0) of suitable conditions for freshwater aquatic life. The average pH value for the October sampling event was slightly below the acceptable range by 0.08.

Table 3-3. Water Quality Results for CY 2013 Coldwater Creek Surface-Water Sampling

Monitoring Parameter	Unit	Monitoring Station						Average
		C002	C003	C004	C005	C006	C007	
First Sampling Event (04/03/13)								
Temperature	°C	7.4	8.0	7.9	7.7	7.0	8.5	7.75
pH	standard unit	6.73	6.63	6.71	6.62	6.13	5.97	6.47
DO	mg/L	4.66	5.17	4.37	5.82	10.09	4.10	5.70
Specific Conductivity	microSiemens per centimeter (µS/cm)	0.172	0.159	0.163	0.161	0.161	0.161	0.160
ORP	millivolt (mV)	214	121	113	102	120	40	118
Turbidity	nephelometric turbidity units (NTU)	111.0	89.9	119.0	168.0	128.0	147.0	127.2
Second Sampling Event (10/17/13)								
Temperature	°C	18.6	18.2	15.6	15.7	14.8	15.8	16.45
pH	standard unit	6.35	6.24	5.9	5.82	5.71	5.48	5.92
DO	mg/L	9.37	9.26	9.25	10.00	7.44	3.82	8.19
Specific Conductivity	µS/cm	83.1	89.9	83.0	73.2	62.8	49.3	73.5
ORP	mV	330	330	323	325	244	233	298
Turbidity	NTU	8.6	7.9	10.1	12.3	26.2	71.1	22.7

Note: Water quality data are used as part of the overall evaluation of water quality, but no ROD-defined monitoring criteria exist.

Average DO levels were 5.70 milligrams per liter (mg/L) in April and 8.19 mg/L in October. Specific conductivity values were lower for the April event compared to the October event. The average specific conductivity for the April sampling event was 0.160 microSiemens per centimeter (µS/cm), and the average specific conductivity for the October sampling event was 73.5 µS/cm. The average ORP value during the April sampling event (118 millivolt [mV]) was lower than that of the October sampling event (298 mV). The average turbidity value during the April sampling event (127.2 nephelometric turbidity units [NTUs]) was more than the October sampling event (22.7 NTUs).

<u>Radiological Parameters</u>

The radiological monitoring results for the CY 2013 CWC surface-water sampling events are summarized in Table 3-4. Historically, FUSRAP surface-water analysis has included unfiltered water samples for the following radiological parameters: Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. Unfiltered surface-water samples from CWC were not analyzed for Ra-228 during CY 2013, because Ra-228 rapidly achieves equilibrium with Th-228, such that their concentrations are equal.

Table 3-4. Radiological Results for CY 2013 Coldwater Creek Surface-Water Sampling

Monitoring Parameter	Monitoring Stations					
	C002	C003	C004	C005	C006	C007
Radionuclide Concentration (pCi/L)						
First Sampling Event (04/03/13)						
Ra-226	2.15	1.62	<1.93[a]	<1.60[a]	<1.20[a]	1.42
Th-228[b]	<0. 87[a]	<0. 38[a]	<0. 65[a]	<0.69[a]	<0.25[a]	<0.80[a]
Th-230	1.19	<0.38[a]	<0.65 [a]	0.69	0.74	<0.29[a]
Th-232	<0.32[a]	<0.38[a]	<0.29[a]	<0.31[a]	<0.25[a]	<0.29[a]
U-234	1.15	1.53	0.62	0.77	0.40	0.93
U-235	<0.61[a]	<0.27[a]	<0.29[a]	<0.57[a]	<0.72[a]	<0.28[a]
U-238	0.49	1.04	<0.24[a]	0.80	0.47	0.42
Second Sampling Event (10/17/13)						
Ra-226	<2.50[a]	<1.41[a]	<1.93[a]	<1.76 [a]	<1.44 [a]	<2.01[a]
Th-228[b]	<0.53[a]	<0.44[a]	<0.18[a]	<0.42[a]	<0.17[a]	<0.19[a]
Th-230	<0.65[a]	0.70	0.33	0.63	<0.17[a]	0.90
Th-232	<0.24[a]	<0.54[a]	<0.39[a]	<0.42[a]	<0.17[a]	<0.51[a]
U-234	1.05	0.95	0.74	<0.27[a]	1.15	1.61
U-235	<0.52[a]	<0.83[a]	<0.35[a]	<0.33[a]	<0.68[a]	<0.31[a]
U-238	0.74	<0.67[a]	0.94	<0.56[a]	0.77	2.10

[a] Reported result is less than the minimum detectable concentration (MDC) and is therefore set equal to the MDC.
[b] Ra-228 rapidly achieves equilibrium with Th-228, such that their concentrations are equal.
Note: Total U (30 µg/L) is the only ROD monitoring guide for surface water. Radiological monitoring parameters data are collected to monitor COC migration and to calculate total U.

Surface-water data for U-234, U-235, and U-238 (reported in pCi/L) were converted to µg/L and compared to the 30 µg/L criterion for total U described in the ROD. The total U concentrations in surface water were well less than the 30 µg/L ROD criterion. A summary of the surface-water radiological data collected from CWC since 2003 is presented in Table 3-5.

Table 3-5. Comparison of Historical Radiological Surface-Water Results for Coldwater Creek

Stations	Radionuclide	Units	04/03	10/03	03/04	10/04	03/05	10/05	03/06	09/06	03/07	10/07	04/08	11/08	04/09	10/09	03/10	10/10	03/11	10/11	03/12	10/12	04/13	10/13
C002	Total U[a]	µg/L	5.1	2.8	1.0	2.1	3.0	1.3	0.72	2.2	2.3	2.2	3.2	2.2	1.6	3.3	2.4	2.3	2.3	3.8	1.9	2.0	2.43	2.64
	Ra-226	pCi/L	<1.8[b]	<2.8[b]	<4.7[b]	<2.4[b]	<0.42[b]	<0.39[b]	<0.44[b]	<0.46[b]	0.52	<0.67[b]	0.81	0.34	<0.39[b]	<0.48[b]	<0.17[b]	<1.51[b]	<2.14[b]	0.87	<1.47[b]	<1.44[b]	2.15	<2.50[b]
	Th-228[c]	pCi/L	<1.6[b]	<1.0[b]	1.8	<1.5[b]	<0.97[b]	<0.45[b]	0.64	<0.38[b]	0.25	<0.53[b]	<0.20[a]	<0.40[a]	<0.59[b]	0.21	0.46	<0.78[b]	<0.52[b]	<0.55[b]	<0.59[b]	<0.45[b]	<0.87[b]	<0.53[b]
	Th-230	pCi/L	<1.8[b]	2.2	2.0	<1.2[b]	<0.97[b]	0.60	<0.55[b]	0.64	0.38	1.3	0.59	<0.40[a]	0.69	0.41	0.28	<0.68[b]	<0.52[b]	0.37	0.46	<0.45[b]	1.19	<0.65[b]
	Th-232	pCi/L	0.65	<1.0[b]	<1.5[b]	<1.2[b]	<0.36[b]	<0.45[b]	<0.77[b]	<0.38[b]	<0.17[b]	<0.38[b]	<0.20[a]	<0.18[a]	<0.59[b]	<0.41[b]	<0.19[b]	<0.68[b]	<0.17[b]	<0.20[b]	<0.42[b]	<0.20[b]	<0.32[b]	<0.24[b]
C003	Total U[a]	µg/L	4.8	3.6	3.5	2.7	4.5	2.8	2.1	1.2	3.1	2.1	4.4	3.6	3.9	3.4	5.4	2.3	6.0	3.4	2.8	2.8	4.09	1.97
	Ra-226	pCi/L	<1.7[b]	<1.4[b]	<1.3[b]	<2.0[b]	<0.41[b]	<0.45[b]	<0.41[b]	1.5	0.20	<0.54[b]	1.32	<0.49[a]	0.29	<.0.65[b]	<0.54[b]	<1.8[b]	<1.3[a]	<1.3[b]	<1.09[b]	<1.50[b]	1.62	<1.41[b]
	Th-228[c]	pCi/L	<1.3[b]	<2.3[b]	<1.2[b]	<1.9[b]	1.4	0.70	<0.54[b]	<0.50[b]	<0.54[b]	<0.42[b]	<0.44[a]	<0.33[a]	<0.50[b]	<0.48 [b]	<0.63[b]	<0.60[b]	<0.53[a]	<0.50[b]	0.43	<0.54[b]	<0.38[b]	<0.44[b]
	Th-230	pCi/L	2.2	2.5	<1.1[b]	2.0	1.6	0.63	0.55	0.67	0.44	1.3	1.32	0.58	<0.41[b]	<0.67[b]	0.60	<0.61[b]	0.52	0.48	<0.23[b]	0.70	<0.38[b]	0.70
	Th-232	pCi/L	<0.60[b]	<1.9[b]	<1.2[b]	<0.59[b]	<0.92[b]	<0.40[b]	<0.20[b]	<0.41	<0.16[b]	<0.19[b]	<0.20[a]	<0.15[a]	0.20	<0.48[b]	<0.23[b]	<0.22[b]	<0.43[b]	<0.18[b]	<0.51[b]	<0.20[b]	<0.38[b]	<0.54[b]
C004	Total U[a]	µg/L	6.4	5.5	2.8	4.0	6.4	4.4	4.3	1.9	2.7	2.1	2.4	2.6	3.4	2.1	6.4	3.0	3.0	2.3	3.4	2.2	1.17	2.48
	Ra-226	pCi/L	<2.2[b]	<2.6[b]	<3.8[b]	1.2	<0.58[b]	<0.54[b]	<0.50[b]	<0.67[b]	0.41	<0.61[b]	<0.63[a]	<0.71[a]	0.64	<0.52[b]	<0.49[b]	<1.5[b]	<1.9[b]	0.64	<1.59[b]	<1.98[b]	<1.93[b]	<1.93[b]
	Th-228[c]	pCi/L	<2.6[b]	<2.7[b]	<1.7[b]	<1.6[b]	<0.93[b]	0.31	0.45	<0.44[b]	<0.53[b]	<0.17[b]	0.31	<0.50[a]	<0.51[b]	0.32	0.52	<0.65[b]	<0.52[b]	<0.49[b]	0.65	<0.18[b]	<0.65[b]	<0.18[b]
	Th-230	pCi/L	4.2	3.1	1.6	2.2	1.3	0.47	0.55	0.71	<0.38[b]	<0.45[b]	0.79	<0.50[a]	<0.51[b]	0.83	0.55	0.58	0.43	<0.49[b]	0.65	0.67	<0.65[b]	0.33
	Th-232	pCi/L	<0.59[b]	<1.1[b]	<0.56[b]	<1.6[b]	<0.34[b]	<0.47[b]	<0.19[b]	<0.20[b]	0.19	<0.19[b]	<0.21[a]	<0.18[a]	<0.51[b]	<0.38[b]	<0.20[b]	<0.24[b]	<0.20[b]	0.25	<0.49[b]	<0.18[b]	<0.29[b]	<0.39[b]
C005	Total U[a]	µg/L	5.0	6.8	2.2	2.8	3.8	4.9	2.1	3.0	4.8	1.4	4.0	3.2	1.8	3.9	3.1	3.0	2.1	2.6	1.7	1.8	2.31	1.42
	Ra-226	pCi/L	<1.5[b]	<1.9[b]	<2.4[b]	2.8	0.83	0.68	0.57	<0.36[b]	<0.51[b]	<0.64[b]	<0.74[a]	<0.20[a]	<0.42[b]	<0.40[b]	0.26	<0.64[b]	<1.8[b]	0.68	<1.48[b]	<2.39[b]	<1.60[b]	<1.76[b]
	Th-228[c]	pCi/L	<1.1[b]	<2.7[b]	0.82	<1.3[b]	0.88	<0.41[b]	<0.56[b]	0.26	<0.39[b]	0.23	<0.46[a]	<0.68[a]	0.21	<0.72[b]	0.33	<0.19[b]	<0.39[b]	0.32	<0.44[b]	<0.41[b]	<0.69[b]	<0.42[b]
	Th-230	pCi/L	1.8	3.4	2.6	1.5	1.5	0.52	0.87	0.46	<0.39[b]	0.99	1.7	0.32	0.41	<0.23[b]	0.27	0.42	<0.39[b]	<0.64[b]	0.44	0.76	0.69	0.63
	Th-232	pCi/L	<0.51[b]	<2.4[b]	<1.2[b]	<0.59[b]	<0.32[b]	<0.41[b]	<0.45[b]	<0.39[b]	<0.39[b]	<0.56[b]	<0.21[a]	<0.17[a]	0.34	<0.23[b]	<0.18[b]	<0.51[b]	<0.18[b]	<0.3[b]	<0.20[b]	<0.41[b]	<0.31[b]	<0.42[b]
C006	Total U[a]	µg/L	5.0	7.3	15	1.4	1.3	2.1	2.0	1.9	3.5	2.2	2.9	3.2	3.2	2.5	2.8	2.6	2.8	1.9	2.8	1.2	1.29	3.11
	Ra-226	pCi/L	<2.4[b]	<0.67[b]	<2.9[b]	<1.9[b]	<0.41[b]	<0.55[b]	<0.57[b]	<0.55[b]	0.51	<0.46[b]	<0.66[a]	0.91	5.26	<0.56[b]	<0.42[b]	<0.64[b]	<1.82[b]	<1.26[a]	<2.00[b]	<0.57[b]	<1.20[b]	<1.44[b]
	Th-228[c]	pCi/L	<2.2[b]	<2.4[b]	<1.9[b]	<1.3[b]	0.54	0.73	<0.56[b]	<0.59[b]	<0.43[b]	<0.36[b]	<0.56[a]	<0.39[a]	0.56	<0.42[b]	<0.42[b]	<0.19[b]	<0.44[b]	<0.57[b]	<0.24[b]	<0.46[b]	<0.25[b]	<0.17[b]
	Th-230	pCi/L	4.6	2.0	1.5	2.4	1.9	1.2	0.83	<0.52[b]	<0.16[b]	0.36	0.60	0.53	<0.48[b]	0.50	0.35	0.42	0.45	0.38	<0.54[b]	<0.53[b]	0.74	<0.17[b]
	Th-232	pCi/L	<1.2[b]	<1.1[b]	<1.5[b]	<0.60[b]	0.18	<0.20[b]	<0.18[b]	<0.19[b]	<0.16[b]	<0.16[b]	<0.20[a]	<0.39[a]	<0.22[b]	<0.19[b]	<0.42[b]	<0.51[b]	<0.21[b]	<0.26[b]	<0.24[b]	<0.17[b]	<0.25[b]	<0.17[b]
C007	Total U[a]	µg/L	4.1	4.7	1.2	2.1	1.9	2.1	1.9	1.7	3.1	1.7	2.7	1.8	2.3	3.0	2.5	2.8	2.6	1.6	1.9	1.3	2.15	5.65
	Ra-226	pCi/L	<1.5[b]	<1.9[b]	<2.2[b]	<1.7[b]	<0.79[b]	<0.43[b]	<0.58[b]	<0.40[b]	0.55	<0.46[b]	<0.81[a]	<0.18[a]	<0.51[b]	0.22	<0.19[b]	<2.24[b]	<1.2[b]	<1.4[b]	<1.53[b]	<1.61[b]	1.42	<2.01[b]
	Th-228[c]	pCi/L	<1.7[b]	<2.0[b]	1.8	<1.2[b]	0.78	0.42	<0.41[b]	<0.38[b]	<0.17[b]	<0.47[b]	0.51	0.18	<0.23[b]	<0.46[b]	<0.47[b]	0.53	<0.43[b]	<0.40[b]	<0.20[b]	<0.37[b]	<0.80[b]	<0.19[b]
	Th-230	pCi/L	2.4	2.3	2.5	2.2	<0.44[b]	1.3	0.62	0.45	<0.17[b]	0.99	1.03	0.47	0.25	<0.46[b]	0.51	<0.49[b]	0.59	0.40	0.59	0.59	<0.29[b]	0.90
	Th-232	pCi/L	<0.55[b]	<1.1[b]	0.86	<0.52[b]	<0.36[b]	<0.36[b]	<0.19[b]	<0.18[b]	<0.17[b]	<0.38[b]	<0.41[a]	<0.16[a]	<0.23[b]	<0.21[b]	<0.21[b]	<0.40[b]	<0.20[b]	<0.18[b]	<0.19[b]	<0.37[b]	<0.29[b]	<0.51[b]

[a] Total U is equal to the sum of the concentrations of U isotopes in pCi/L divided by 0.677, where 0.677 microgram per picocurie is the specific activity for total U, assuming secular equilibrium.
[b] Reported result is less than the MDC and is therefore set equal to the MDC.
[c] Ra-228 rapidly achieves equilibrium with Th-228, such that their concentrations are equal.
Note: Total U (30 µg/L) is the only ROD monitoring guide for surface water. The other radiological monitoring parameters data are collected to monitor COC migration.

Chemical Parameters

No chemical-specific ROD monitoring guidelines exist for surface water. Chemical monitoring parameters data are collected to monitor COC migration. The chemical monitoring results for the CY 2013 CWC surface-water sampling events are presented in Table 3-6.

Table 3-6. Chemical Results for CY 2013 Coldwater Creek Surface-Water Sampling

Monitoring Parameter[a]	Monitoring Stations					
	C002	C003	C004	C005	C006	C007
Target Analyte List Metals Concentration (µg/L)						
First Sampling Event (04/03/13)						
Antimony	<1.7[b]	<1.7[b]	<1.7[b]	<1.7[b]	<1.7[b]	<1.7[b]
Arsenic	3.6	3.6	3.1	2.9	2.3	2.2
Barium	160	160	150	170	150	150
Cadmium	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]
Chromium	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]
Molybdenum	10.0	11.0	10.0	10.0	8.7	8.9
Nickel	2.3	2.2	2.5	3.2	2.7	2.5
Selenium	3.8	2.7	3.7	2.0	5.0	2.4
Thallium	0.69	0.88	0.85	<0.55[b]	<0.55[b]	<055[b]
Vanadium	<2.4[b]	<2.4[b]	<2.4[b]	<2.4[b]	<2.4[b]	<2.4[b]
Second Sampling Event (10/17/13)						
Antimony	<1.7[b]	<1.7[b]	<1.7[b]	<1.7[b]	2.4	2.3
Arsenic	3.8	2.9	3.0	2.5	2.1	2.4
Barium	110	110	110	98	84	81
Cadmium	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]	<0. 1[b]
Chromium	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]	<3.3[b]
Molybdenum	16.0	15.0	15.0	11.0	8.9	10.0
Nickel	2.3	2.3	2.3	2.4	2.2	2.5
Selenium	2.5	2.5	2.8	1.8	2.6	2.3
Thallium	<0.55[b]	<0.55[b]	<0.55[b]	<0.55[b]	<0.55[b]	<055[b]
Vanadium	<2.4[b]	<2.4[b]	<2.4[b]	3.1	2.9	3.4

[a] No chemical-specific ROD monitoring guidelines exist for surface water.
[b] Reported result is less than the MDC and is therefore set equal to the MDC.

3.2.2 Coldwater Creek Sediment Monitoring Results

During CY 2013, sediment sampling at CWC was conducted during the months of April and October as part of the EMP. Sediment samples were collected in depositional environments near each of the six previously described surface-water locations (C002 through C007) (Figure 3-3) and analyzed according to the methods described in the SAG (USACE 2000). Sediment samples, collected for the EMP, were evaluated for the radiological and metal constituents listed in Table 3-3 of the EMICY13 (USACE 2012).

All sediment monitoring required through implementation of the EMICY13 was conducted as planned during CY 2013 (USACE 2012). The evaluation of monitoring data demonstrates that all applicable ARARs have been met. The analytical results from these monitoring activities are presented in Appendix D, Table D-2, of this report.

Radiological Parameters

The radiological results for CY 2013 CWC sediment sampling events are presented in Table 3-7. The ROD (USACE 2005) established sediment RGs for Ra-226, Th-230, and U-238 at the NC Sites. Therefore, sediment sampling results for those radionuclides were compared against their corresponding RGs. Sediment samples from CWC were not analyzed for U-234 during CY 2013, because U-234 is assumed to be in equilibrium with U-238.

Table 3-7. Radiological Results for CY 2013 Coldwater Creek Sediment Sampling

Monitoring Parameter	RGs[a]	Monitoring Stations					
		C002	C003	C004	C005	C006	C007
Radionuclide Concentration (picocuries per gram [pCi/g])							
First Sampling Event (04/03/13)							
Ac-227	No RG	<0.18[b]	<0.32[b]	<0.24[b]	<0.33[b]	<0.29[b]	<0.32[b]
Pa-231	No RG	<0.55[b]	<0.82[b]	<0.66[b]	<0.92[b]	<0.80[b]	<0.85[b]
Ra-226	15	0.91	1.41	1.16	1.28	1.13	1.32
Ra-228	No RG	0.30	0.91	0.72	0.87	0.99	0.85
Th-228[c]	No RG	0.30	1.01	0.74	0.64	0.97	0.86
Th-230[c]	43	1.06	3.92	2.37	4.65	2.18	3.25
Th-232[c]	No RG	0.36	0.99	0.84	1.08	1.31	0.62
U-235	No RG	<0.23[b]	<0.37[b]	<0.30[b]	<0.39[b]	<0.35[b]	<0.38[b]
U-238[d]	150	0.74	0.90	0.96	0.90	0.73	1.05
Second Sampling Event (10/17/13)							
Ac-227	No RG	<0.12[b]	<0.13[b]	<0.16[b]	<0.14[b]	<0.21[b]	<0.19[b]
Pa-231	No RG	<0.33[b]	<0.34[b]	<0.40[b]	<0.33[b]	<0.54[b]	<0.47[b]
Ra-226	15	1.01	1.03	1.25	1.01	1.37	1.20
Ra-228	No RG	0.28	0.36	0.62	0.47	0.91	0.54
Th-228[c]	No RG	<0.16[b]	0.94	1.09	0.82	1.07	0.94
Th-230[c]	43	1.20	1.90	2.15	3.26	1.57	4.50
Th-232[c]	No RG	<0.44[b]	<0.35[b]	1.42	0.49	0.88	0.69
U-235	No RG	<0.17[b]	<0.18[b]	<0.22[b]	<0.18[b]	<0.27[b]	<0.23[b]
U-238[d]	150	0.51	0.50	1.04	0.58	0.93	0.86

[a] RGs presented in the ROD (USACE 2005).
[b] Reported result is less than the MDC and is therefore set equal to the MDC.
[c] Both gamma-spec and alpha-spec results are produced; alpha-spec results are reported.
[d] U-238 and U-234 are assumed to be in equilibrium.

All sediment data results were below the RGs established by the ROD. The historical radiological sediment sampling information for all monitoring stations since 2003 is summarized in Table 3-8.

<u>Chemical Parameters</u>

Chemical monitoring results for CY 2013 CWC sediment sampling events are presented in Table 3-9.

3.2.3 Impact of FUSRAP Coldwater Creek Remedial Action on Total Uranium Concentrations in Coldwater Creek Surface Water and Sediment

As part of the FUSRAP RA at the SLAPS, sediment and soil were removed from the bed and banks of CWC near monitoring stations C002 and C003 during August of 2004. An evaluation was conducted to determine if the SLAPS RA resulted in increased levels of uranium in CWC. The concentrations of radionuclides in sediment and surface-water samples from various stations along CWC were assessed. Radionuclide data from surface-water and sediment samples collected from March of 2000 to March of 2004 were used to create a baseline for comparison with sample results collected after the RA.

Table 3-8. Comparison of Historical Radiological Sediment Results for Coldwater Creek

Stations	Radionuclide	Units	04/03	10/03	03/04	10/04	03/05	10/05	03/06	09/06	03/07	10/07	04/08	11/08	03/09	10/09	03/10	10/10	03/11	10/11	03/12	10/12	04/13	10/13
C002	Total U[a]	pCi/g	1.5	3.9	1.8	1.1	0.91	0.93	1.2	1.7	0.97	1.1[b]	1.7	0.73	0.80	0.89	1.3	1.3	1.4	1.1	0.84	1.21	1.49	1.02
	Ra-226	pCi/g	0.88	0.93	0.99	0.89	0.92	0.69	0.74	0.72	0.97	<0.37[b,c]	1.0	0.85	0.75	1.07	0.71	0.95	0.87	0.85	0.89	0.911	0.91	1.01
	Ra-228	pCi/g	0.21	0.24	0.28	0.16	0.26	0.26	0.22	0.29	0.20	0.18	0.20	0.17	0.20	0.24	0.30	0.33	0.27	0.28	0.24	0.372	0.30	0.28
	Th-228	pCi/g	0.58	0.38	0.49	0.40	0.51	0.61	0.75	0.67	0.26	0.24[b]	0.53	0.41	0.50	0.35	0.46	0.44	0.26	0.37	0.37	0.37	0.30	<0.16
	Th-230	pCi/g	0.67	0.81	1.0	1.0	0.78	0.98	1.1	1.3	1.2	0.84[b]	0.92	1.1	0.51	1.2	0.67	1.2	1.5	1.1	0.52	0.64	1.06	1.20
	Th-232	pCi/g	0.19	0.17	0.12	<0.27[c]	<0.26[c]	0.41	0.30	0.22	0.46	<0.24[b,c]	0.24	<0.26[c]	0.28	0.31	0.53	0.21	<0.29[c]	0.39	0.35	0.47	0.36	<0.44
C003	Total U[a]	pCi/g	1.4	3.3	1.8	0.85	1.6	2.0	1.4	1.4	1.2	2.0[b]	1.9	2.3	1.2	2.9	0.72	1.7	1.4	1.5	1.20	1.78	1.80	1.01
	Ra-226	pCi/g	0.72	0.96	0.81	0.92	1.0	1.5	1.1	1.3	1.5	1.7[b]	1.1	1.1	0.79	1.4	0.98	1.1	0.73	1.2	1.07	1.33	1.41	1.03
	Ra-228	pCi/g	0.30	0.25	0.38	0.33	0.59	0.86	0.45	0.38	0.68	0.49	0.49	0.57	0.40	1.0	0.44	0.36	0.39	0.79	0.81	0.78	0.91	0.36
	Th-228	pCi/g	1.3	0.47	0.74	0.57	1.1	0.92	1.2	0.34	0.97	0.53[b]	0.70	0.66	0.64	1.1	0.85	0.42	0.55	1.79	1.69	1.23	1.01	0.94
	Th-230	pCi/g	1.4	0.81	2.4	3.3	3.5	1.5	2.6	3.8	1.2	1.5[b]	2.1	2.3	1.2	1.5	1.0	1.1	0.89	1.9	1.81	1.19	3.92	1.90
	Th-232	pCi/g	0.35	0.14	0.35	0.41	0.75	0.71	0.69	0.43	0.38	0.46[b]	0.51	0.57	0.34	0.73	0.43	0.17	0.64	1.22	1.28	1.18	0.99	<0.35
C004	Total U[a]	pCi/g	2.1	5.2	2.9	1.6	2.1	2.1	1.6	1.9	2.7	7.3[b,d]	2.0	2.3	2.0	3.3	1.8	2.6	1.8	2.0	2.84	3.09	1.97	2.14
	Ra-226	pCi/g	1.0	1.1	0.93	1.1	1.0	1.3	1.2	1.2	1.3	1.6[b]	1.0	1.0	0.97	1.3	1.3	1.5	1.1	1.3	1.13	1.28	1.16	1.25
	Ra-228	pCi/g	0.82	0.90	0.83	0.72	0.85	0.87	0.83	0.74	0.80	0.81	0.70	1.0	0.73	0.85	0.62	0.81	0.85	0.96	0.85	0.86	0.72	0.62
	Th-228	pCi/g	0.94	1.4	1.7	1.6	0.99	1.1	0.9	0.93	1.7	1.3[b]	1.2	1.4	0.83	1.1	0.90	1.2	1.4	1.3	1.72	1.24	0.74	1.09
	Th-230	pCi/g	1.7	1.6	2.4	1.4	2.0	2.2	2.2	2.1	2.6	2.2[b]	2.0	1.0	1.7	2.0	2.2	1.6	2.7	3.8	2.41	1.28	2.37	2.15
	Th-232	pCi/g	0.99	0.84	1.0	0.92	0.82	0.86	1.0	0.85	0.79	0.97[b]	1.3	0.80	0.82	1.0	0.77	1.0	0.85	1.1	1.45	1.13	0.84	1.42
C005	Total U[a]	pCi/g	2.4	5.4	2.2	1.8	3.3	2.0	2.3	2.0	0.94	2.0[b]	2.0	3.6	1.6	2.8	1.6	3.6	1.8	2.5	4.36	2.5	1.86	1.20
	Ra-226	pCi/g	1.7	2.2	1.3	1.9	1.6	1.8	1.4	1.4	1.7	1.6[b]	1.1	5.4	1.0	1.4	1.5	2.5	1.2	1.5	1.47	1.33	1.28	1.01
	Ra-228	pCi/g	0.66	0.74	0.53	0.53	0.85	0.73	0.78	0.53	0.98	0.58	0.78	1.1	0.31	0.86	0.73	0.88	0.56	0.94	0.92	0.90	0.87	0.47
	Th-228	pCi/g	1.2	1.3	0.98	0.79	0.99	0.95	1.5	1.0	1.5	0.68[b]	0.98	1.7	0.50	1.3	0.92	0.96	0.61	0.61	1.05	1.30	0.64	0.82
	Th-230	pCi/g	8.7	23	3.8	3.5	8.4	4.5	11	11	4.7	3.7[b]	6.6	82.6	4.2	9.6	2.2	19.6	3.9	3.4	4.3	5.42	4.65	3.26
	Th-232	pCi/g	1.0	0.69	0.57	0.20	0.43	0.57	1.3	0.77	1.6	0.45[b]	0.98	1.4	0.50	0.87	0.65	1.1	0.63	0.87	1.01	1.23	1.08	0.49
C006	Total U[a]	pCi/g	1.8	4.8	1.0	1.9	2.6	1.8	2.7	2.3	2.9	2.3[b]	1.7	1.8	2.1	0.75	1.9	2.2	2.0	1.0	2.35	1.97	1.53	1.87
	Ra-226	pCi/g	1.3	1.1	1.1	1.1	1.2	1.3	1.3	1.3	1.4	0.94[b]	1.0	1.4	1.0	1.1	1.7	1.7	1.3	0.90	1.16	1.02	1.13	1.37
	Ra-228	pCi/g	0.87	0.86	0.94	0.74	0.94	1.0	0.74	0.92	0.97	0.93	0.88	0.98	0.82	0.99	0.88	0.88	0.86	0.48	1.06	0.94	0.99	0.91
	Th-228	pCi/g	1.2	1.7	1.6	2.0	1.4	1.2	0.92	2.0	0.99	1.6[b]	1.7	0.94	1.5	1.6	1.0	0.82	1.9	0.54	1.38	1.03	0.97	1.07
	Th-230	pCi/g	1.7	3.7	3.2	3.1	2.2	2.1	2.8	3.2	1.8	2.7[b]	3.4	2.2	2.2	2.6	2.0	4.1	9.7	1.2	3.39	1.78	2.18	1.57
	Th-232	pCi/g	1.0	1.2	0.79	0.64	1.3	0.98	1.3	0.85	1.1	1.4[b]	1.1	1.2	1.1	0.97	0.80	0.71	1.6	0.82	1.00	1.30	1.31	0.88
C007	Total U[a]	pCi/g	2.4	6.0	0.90	0.99	2.8	1.6	2.1	1.9	2.0	2.3[b]	1.4	2.3	1.9	2.6	2.2	1.7	1.9	2.4	2.45	3.08	2.13	1.79
	Ra-226	pCi/g	1.1	1.3	1.4	1.5	1.1	1.5	1.3	1.5	1.9	1.1[b]	1.1	1.4	1.1	1.3	1.4	1.4	1.3	1.4	1.23	1.06	1.32	1.20
	Ra-228	pCi/g	0.85	0.95	1.1	0.90	0.87	0.90	0.99	0.87	0.79	0.84	0.69	0.89	0.77	0.77	0.82	0.73	0.87	0.81	0.89	0.80	0.85	0.54
	Th-228	pCi/g	1.4	1.5	2.1	1.4	0.79	1.2	1.2	1.0	1.2	1.5[b]	0.73	0.67	1.1	0.66	1.0	0.78	1.4	1.3	2.07	0.96	0.86	0.94
	Th-230	pCi/g	2.8	4.2	2.0	3.5	5.6	2.9	3.8	2.8	19	4.6[b]	3.8	3.6	3.6	2.3	2.6	4.4	3.3	2.8	3.51	2.73	3.25	4.50
	Th-232	pCi/g	0.79	0.66	1.4	0.94	0.98	1.4	1.1	0.84	1.2	0.83[b]	0.55	0.72	1.00	0.57	1.04	0.72	0.93	0.95	1.14	0.70	0.62	0.69

[a] Total U is equal to the sum of the concentrations of U isotopes (Office of the Federal Register, NARA 1998).
[b] Both gamma-spec and alpha-spec results were produced; for Table 3-8, gamma-spec results are reported.
[c] Reported result is less than the MDC and is therefore set equal to the MDC.
[d] The 7.3 pCi/g value for total U obtained on 10/07 from C004 was a typographical error and the result should be reported as 1.3.

Note: The sediment RGs for Ra-226, Th-230, and U-238 are 15 pCi/g, 43 pCi/g, and 150 pCi/g, respectively. The other radiological monitoring parameters data are collected to monitor COC migration.

Table 3-9. Chemical Results for CY 2013 Coldwater Creek Sediment Sampling

Monitoring Parameter	Monitoring Stations					
	C002	C003	C004	C005	C006	C007
Target Analyte List Metals Concentration (milligrams per kilogram [mg/kg])						
First Sampling Event (04/03/13)						
Antimony	<1.5[a]	<2.1[a]	<1.9[a]	<2.3[a]	<1.8[a]	<2.0[a]
Arsenic	1.7	8.7	7.9	6.7	3.9	7.5
Barium	21	150	230	160	83	150
Cadmium	0.41	0.32	0.9	0.98	<0.29[a]	0.75
Chromium	4.0	13.0	24.0	23.0	14.0	23.0
Molybdenum	<2.3[a]	<3.2[a]	<3.0[a]	<3.5[a]	<2.9[a]	<3.1[a]
Nickel	3.0	21.0	20.0	19.0	13.0	17.0
Selenium	2.1	1.7	<0.87[a]	<1.0[a]	<0.83[a]	<0.9[a]
Thallium	<3.4[a]	<4.8[a]	<4.6[a]	<5.3[a]	<4.3[a]	<4.7[a]
Vanadium	5.3	25.0	25.0	18.0	17.0	20.0
Second Sampling Event (10/17/13)						
Antimony	<0.88[a]	<1.0[a]	<1.1[a]	<1.0[a]	<1.1[a]	<1.3[a]
Arsenic	13.0	7.9	32	8.1	2.2	12.0
Barium	2,800	190	270	98	100	230
Cadmium	1.1	0.51	0.93	1.2	0.18	1.4
Chromium	170	16.0	22.0	49.0	18.0	80.0
Molybdenum	6.9	1.6	2.1	1.8	<0.8[a]	8.0
Nickel	16.0	8.8	35.0	16.0	17.0	36.0
Selenium	1.4	1.3	3.9	<0.96[a]	1.9	3.0
Thallium	<0.81[a]	<0.93[a]	<1.0[a]	<0.93[a]	<0.99[a]	<1.2[a]
Vanadium	25.0	18.0	61.0	23.0	22.0	32.0

[a] Reported result is less than the DL and is therefore set equal to the DL.

Note: There are no chemical-specific ROD RGs or monitoring guidelines for sediment. Chemical monitoring parameters data are collected to monitor COC migration.

Methodology

Total U results from surface-water and sediment samples from the six monitoring stations (C002 through C007) for 2013 were compared to the 2000 to 2004 dataset for this evaluation. Total U was selected for this evaluation, because it is among the most mobile of all the radionuclide COCs present at the SLAPS.

Qualitative trend line graphs of total U results from surface-water samples collected at monitoring stations C002 through C007 from March of 2000 to October of 2013 are presented on Figure 3-4. The mean, 95 percent upper confidence limit (UCL_{95}), and 95 percent lower confidence limit (LCL_{95}) concentrations of total U calculated from the March 2000 to March 2004 dataset are also shown on this figure.

Qualitative trend line graphs of total U results from sediment samples collected at monitoring stations C002 through C007 from March of 2000 to October of 2013 are presented on Figure 3-5. The mean, UCL_{95}, and LCL_{95} concentrations of total U calculated from the March 2000 to March 2004 dataset are also shown on this figure.

The total U concentration statistics for surface water and sediment in CWC for 2000 through 2004 are presented in Table 3-10.

Table 3-10. Total U Concentration Statistics for Coldwater Creek (2000-2004)

Stations	Statistics for Total U in Surface Water March 2000 to March 2004 data (pCi/L)			Statistics for Total U in Sediment March 2000 to March 2004 data (pCi/g)		
	UCL_{95}	Mean	LCL_{95}	UCL_{95}	Mean	LCL_{95}
C002	4.2	3.1	1.9	1.7	1.4	1.1
C003	3.8	3.3	2.7	1.9	1.5	1.0
C004	4.5	3.4	2.3	2.3	1.7	1.2
C005	4.1	3.0	1.9	2.8	2.4	2.0
C006	8.2[a]	5.0	[b]	3.0	2.4	1.8
C007	4.7	3.4	0.75	2.5	1.9	1.3

[a] March 2000 to March 2004 data are gamma distributed. Therefore, approximate gamma upper confidence limit (UCL) is used.
[b] LCL_{95} is not calculated due to gamma-distributed data.

Conclusion

The data fit two hypothetical scenarios. First, the post-RA sampling results were not significantly below the pre-RA sampling results for downstream stations at the SLAPS (C003 through C007), so it is unlikely that total U on the SLAPS was causing a significant contribution to CWC. The RA over time should markedly reduce the total U load in CWC if the SLAPS were a significant contributor. While a time lag in the fate downstream could occur, the current total U concentrations are already low. Second, the RA within CWC did not adversely impact concentrations of total U in CWC surface water or sediment. Had the RA contributed adversely, an excessive short-term increase in total U concentrations could have been observed.

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4.0 EVALUATION OF GROUND-WATER MONITORING DATA

Twenty ground-water monitoring wells were sampled at the NC Sites during CY 2013. Ground water was sampled following protocol for individual wells and analytes and was analyzed for various radiological constituents and inorganic analytes. Static water levels were measured quarterly at the retained monitoring wells. In addition, field parameters were measured continuously during purging of the wells before sampling. The static water levels and other ground-water field parameter results for CY 2013 sampling are presented in Appendix E, Tables E-1 and E-2. Summary tables providing the NC Sites ground-water analytical sampling results for CY 2013 are found in Appendix E, Tables E-3 and E-4.

Ground-Water Guidelines

The CY 2013 ground-water monitoring data for the NC Sites are compared to the ROD ground-water monitoring guidelines (i.e., ROD guidelines) listed in Tables F-1 and F-2 in Appendix F of this EMDAR. The ROD guidelines for the NC Sites are based on requirements specified in the ROD (USACE 2005) and are further explained in Sections 4.1.1 and 4.2.1.

Stratigraphy at the North St. Louis County Sites

The stratigraphic units present at the NC sites are shown in the stratigraphic column presented on Figure 4-1. Fill and topsoil (Unit 1) overlie Pleistocene loess (Unit 2) and glaciolacustrine deposits. The glaciolacustrine sediments consist of Subunit 3T (silty clay), Subunit 3M (moderately to highly plastic clay), Subunit 3B (silty clay), and Unit 4 (clayey and sandy gravel). Beneath these unconsolidated deposits, the bedrock is composed of Mississippian limestone (Unit 6). Stratigraphic Unit 5, Pennsylvanian shale bedrock, is not present at the HISS or Futura but is found directly overlying Unit 6 under portions of the SLAPS.

4.1 LATTY AVENUE PROPERTIES

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

Stratigraphy at the Latty Avenue Properties

Four HZs (HZ-A through HZ-C, and HZ-E) have been identified at the Latty Avenue Properties. The shallow ground-water zone, HZ-A, consists of the fine-grained silts and clays of Unit 1, Unit 2, and Subunit 3T. Underlying HZ-A is HZ-B, which consists of a highly impermeable clay (Subunit 3M). HZ-C consists of silty clay, clayey silt, and clayey gravel deposits that make up the stratigraphic Subunit 3B and Unit 4. The Mississippian limestone bedrock is defined as HZ-E. HZ-E is the protected aquifer for the site. As a result of their very low permeability, Subunits 3M and 3B limit vertical ground-water movement between HZ-A and the deep ground-water zones (HZ-C and HZ-E) at the Latty Avenue Properties.

Summary of CY 2013 Ground-Water Monitoring Results at the Latty Avenue Properties

Based on an evaluation of the ground-water data at the Latty Avenue Properties, two inorganic soil COCs (arsenic and molybdenum) and three radiological soil COCs (U-234, U-238, and total U) were detected at concentrations above the ROD guidelines in HZ-A ground water at the Latty Avenue Properties in CY 2013. Molybdenum concentrations were detected above the ROD guidelines in two wells, HW22 and HISS-10. However, molybdenum does not exceed its ROD guideline at HW22 when measurement error is taken into account. The concentrations of molybdenum in HISS-10 and arsenic in HW22 have been above the ROD guidelines for more than 12 months. In addition, the three radiological COCs (U-234, U-238, and total U) have been above their ROD guidelines for more than a 12-month period in HZ-A ground water at HISS-01, based on previous sampling results. The concentrations of U-234 and U-238 were also above the ROD guidelines in HISS-10, but the concentrations were not above the ROD guidelines when measurement error is taken into account. Because a significant degrading of CWC surface water has not occurred, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water.

Based on the CY 2013 results and associated measurement errors, one well (HW23) had concentrations of U-234 (6.6 pCi/L) exceeding the ROD ground-water guideline (3.8 pCi/L) in HZ-C ground water during CY 2013. It has exceeded the ROD guideline for more than 12 months, based on the previous sampling results (4.8 pCi/L in August 2011). However, the total U concentration is not above the monitoring guideline of 30 µg/L. In addition, a significant degrading of CWC surface water has not occurred. Therefore, no findings currently indicate significantly degraded ground-water conditions in HZ-C ground water. An evaluation of potential response actions is not required.

4.1.1 Evaluation of Ground-Water Monitoring Data at the Latty Avenue Properties

The ground-water monitoring data for the Latty Avenue Properties are evaluated against the requirements for ground-water monitoring identified in the ROD (USACE 2005). The ROD specifies two types of ground-water monitoring guidelines: (1) response-action monitoring guidelines and (2) a total U monitoring guideline (which is used for both response-action and long-term monitoring). Response-action monitoring of HZ-A and HZ-C is being conducted to ensure that the RA does not degrade current ground-water conditions. Another purpose of the response-action ground-water monitoring of HZ-C is to document the protection of the limestone aquifer (HZ-E) during the RA.

The response-action monitoring guideline is two times the UCL_{95}, based on historical concentrations of the analyte in a particular well before RAs were initiated under the ROD. The response-action monitoring guidelines have been developed for the ROD soil COCs for each of the wells at the Latty Avenue Properties. The methodology for the development of the response-action monitoring guidelines is detailed in Appendix F of this document. The total U guideline is defined in the ROD to be equal to the total U maximum contaminant level of 30 µg/L (USACE 2005). If total U levels exceed 30 µg/L, monitoring would continue subject to a 5-year review.

In addition to the previous requirements, an evaluation of concentration trends over time is conducted for the COCs detected above the ROD guidelines in ground water to support assessment of the effectiveness of the RA in the CERCLA 5-year reviews.

Monitoring Well Network at the Latty Avenue Properties

The CY 2013 EMP well network for the Latty Avenue Properties is shown on Figure 4-2. With the exception of monitoring well HW23, which is screened in HZ-C, the monitoring wells are screened in HZ-A. The screened HZs for the ground-water monitoring wells at the Latty Avenue Properties are identified in Table 4-1.

Table 4-1. Screened HZs for Ground-Water Monitoring Wells at the Latty Avenue Properties During CY 2013

Well ID	Screened HZs
HISS-01[a]	HZ-A
HISS-06A[a]	HZ-A
HISS-10[a]	HZ-A
HISS-11A[a]	HZ-A
HISS-17S[a]	HZ-A
HISS-19S	HZ-A
HW22[a]	HZ-A
HW23[a]	HZ-C

[a] Wells sampled in CY 2013.

Ground-water sampling was conducted at seven ground-water monitoring wells at the Latty Avenue Properties during CY 2013. First-quarter sampling was conducted on March 6 and 7, 2013; second-quarter sampling was conducted on May 20, 2013; and third-quarter sampling was conducted on August 28 and 29, 2013. No ground-water sampling was conducted at the Latty Avenue Properties during the fourth quarter.

HZ-A Ground Water

Ground-water samples were collected from six HZ-A wells during CY 2013. Summary tables presenting the analytical data for all analytes are included in Appendix E.

For response-action monitoring, the CY 2013 ground-water data were evaluated to determine if ground-water conditions have significantly degraded. Continued monitoring of HZ-A could be required long term if significantly degraded ground-water conditions are found. Based on the ROD, 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 historical 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 (UCL) of the mean (based on the historical concentration before RA) 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.

The CY 2013 results were compared to the ROD guidelines for the soil COCs identified in the ROD (i.e., antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, total U, vanadium, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238). Those soil COCs with concentrations above the ROD guidelines in HZ-A ground-water samples at the Latty Avenue Properties during CY 2013 are listed in Table 4-2. Because no ground-water sampling data is available for HISS-06A and HISS-11A prior to CY 2011, the ROD guidelines for HISS-06A and HISS-11A were developed using the pre-2006 data from the wells previously at these locations (HISS-06 and HISS-11, respectively).

Table 4-2. Analytes Exceeding ROD Guidelines in HZ-A Ground Water at the Latty Avenue Properties During CY 2013

Analyte	Units	Station	ROD Guidelines[a]	Minimum Detected	Maximum Detected	Mean Detected	No. Detects > ROD Guidelines[a]	Frequency of Detection
Arsenic	µg/L	HW22	2.4	130	130	130	1	1/1
Molybdenum	µg/L	HISS-10	5.6	21	21	21	1	1/1
	µg/L	HW22	3.4	6.5[b]	6.5[b]	6.5[b]	1	1/1
U-234	pCi/L	HISS-01	12	16.5	17.3	16.9	2	2/2
	pCi/L	HISS-10	6.6	6.7[b]	6.7[b]	6.7[b]	1	1/1
U-235	pCi/L	HISS-01	---	2.7[c]	2.7[c]	2.7[c]	0	1/2
U-238	pCi/L	HISS-01	13	15.7[b]	18.5	17.2[b]	2	2/2
	pCi/L	HISS-10	5.2	5.8[b]	5.8[b]	5.8[b]	1	1/1
Total U[d]	µg/L	HISS-01	30	47.0	56.5	51.7	2	2/2

[a] ROD guidelines include the response-action monitoring guidelines and the total U monitoring guideline of 30 µg/L. Response-Action Monitoring Guideline = 2 x UCL_{95}, based on historical concentrations before RAs were initiated (USACE 2005). Results are reported to two significant digits.
[b] The concentration of molybdenum detectedreplac in HW22 is not above the ROD guideline when the measurement error (5 µg/L) is taken into account. The concentrations of U-234 and U-238 detected in HISS-10 and the minimum and average concentrations of U-238 detected in HISS-01 do not exceed the ROD guidelines when the measurement errors are taken into account.
[c] The results for U-235 do not exceed the ROD guidelines. The U-235 results are provided because they were used in the total U calculation.
[d] Total U values were calculated from isotopic concentrations in pCi/L and converted to µg/L using radionuclide-specific activities using the following formula: total U (µg/L) = U-234 (pCi/L)/6240 + U-235 (pCi/L)/2.16 + U-238 (pCi/L)/0.335.
--- No monitoring guideline due to lack of detected results in historical dataset.

Two inorganic soil COCs were detected at concentrations above the ROD guidelines in HZ-A ground water at the Latty Avenue Properties: arsenic (HW22) and molybdenum (HISS-10 and HW22). The concentrations of molybdenum in HW22 are not above the ROD guidelines when measurement error is taken into account. The concentration of molybdenum in HISS-10 was above the ROD guideline during the previous sampling event conducted at HISS-10. Therefore, concentrations of molybdenum in HISS-10 have been above the ROD guideline for more than 12 months. However, CWC surface-water and sediment sampling results for CY 2013, presented in Section 3.2, do not indicate an increase in molybdenum concentrations in CWC. The concentrations of arsenic at HW22 were above the ROD guideline during the third-quarter sampling event conducted at HW22 in CY 2013, as well as in the previous CY 2012 and CY 2011 sampling events. Therefore, concentrations of arsenic at HW22 have been above the ROD guideline for more than 12 months. The concentrations of arsenic in CWC surface water and sediment in CY 2013 are low, supporting the conclusion that elevated arsenic concentrations are localized to HW22 and are not impacting CWC. Because a significant degrading of CWC surface water has not occurred, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water.

Concentrations of the radiological COCs U-234 and U-238 were above the ROD guidelines in HZ-A ground water at the Latty Avenue Properties in CY 2013. The concentrations of U-234 and U-238 were above the ROD guidelines in HISS-01 during the first- and third-quarter sampling events conducted at HISS-01 in CY 2013, as well as during the sampling events conducted in CY 2012. Therefore, U-234 and U-238 have exceeded the ROD guidelines for more than 12 months at HISS-01. The concentrations of U-234 and U-238 were also above the ROD guidelines in HISS-10 during the first-quarter sampling event conducted in CY 2013. However, the concentrations of U-234 and U-238 in HISS-10 are not above the ROD guidelines when measurement error is taken into account.

The ROD guideline for total U (30 µg/L) is used for both response-action and long-term monitoring of ground water at the Latty Avenue Properties. Total U concentrations were compared to the 30 µg/L monitoring guideline. Total U concentrations (in µg/L) were calculated as follows from the isotopic results (in pCi/L) and the specific activities (in picocuries per microgram [pCi/µg]) for each radionuclide.

$$TotalU\left(\mu g/L\right)=\left[\frac{U^{234}\left(pCi/L\right)}{6240\left(pCi/\mu g\right)}\right]+\left[\frac{U^{235}\left(pCi/L\right)}{2.16\left(pCi/\mu g\right)}\right]+\left[\frac{U^{238}\left(pCi/L\right)}{0.335\left(pCi/\mu g\right)}\right]$$

Total U concentrations in samples collected from HISS-01 again exceeded the 30 µg/L monitoring guideline, creating an exceedance period of more than 12 months. Based on trend analysis, total U concentrations have shown a statistically significant increase at HISS-01 from CY 1999 to CY 2013. However, CWC surface-water sampling results for CY 2013, presented in Section 3.2, indicate no increase in total U concentrations. Therefore, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water at the Latty Avenue Properties.

In summary, comparison of the data to the ROD guidelines indicate that two inorganic soil COCs (arsenic and molybdenum) and three radiological COCs (U-234, U-238, and total U) exceeded the ROD guidelines for a period of at least 12 months. However, because a significant degrading of CWC surface water has not occurred, there is currently no finding of significantly degraded ground-water conditions in HZ-A ground water.

HZ-C Ground Water

Ground-water samples were collected from one HZ-C well (HW23) during CY 2013. This well was sampled for both radionuclides and inorganics during the second quarter. Table 4-3 lists those soil COCs with concentrations above the ROD ground-water guidelines in HZ-C ground-water samples at the Latty Avenue Properties during CY 2013. Concentrations of all inorganic soil COCs were below the ROD ground-water guidelines in HW23 during CY 2013.

One radiological COC, U-234, was above its ROD ground-water guideline in CY 2013 in ground-water samples from HW23. When measurement error is taken into account, the result is only slightly (i.e., within 1 pCi/L) above the ROD ground-water guideline. The concentration of U-234 was also slightly above the ROD ground-water guideline in the previous sampling event for this well (August 2011). Although U-234 has been above its ROD ground-water guideline for a period of at least 12 months in HW23, the total U concentration in HW23 (calculated from the isotopic concentrations) did not exceed the total U monitoring guideline of 30 µg/L. Therefore, because COCs are not present at significantly increased concentrations and total-U concentrations are not above 30 µg/L in HZ-C, no findings currently indicate significantly degraded ground-water conditions in HZ-C.

Table 4-3. Analytes Exceeding ROD Ground-Water Criteria in HZ-C Ground Water at the Latty Avenue Properties During CY 2013

Analyte	Units	Station	ROD Ground-Water Criteria[a]	Minimum Detected	Maximum Detected	Mean Detected	No. Detects > ROD Ground-Water Criteria[a]
U-234	pCi/L	HW23	3.8	6.6	6.6	6.6	1

[a] ROD ground-water guidelines include the response-action monitoring guidelines and the total U monitoring guideline of 30 µg/L. Response-action monitoring guideline = 2 x UCL_{95}, based on historical concentrations before RAs were initiated (USACE 2005).

Note: Results are reported to two significant digits.

In summary, the CY 2013 HZ-C ground-water data from the Latty Avenue Properties indicate that one analyte, U-234, was detected at concentrations above its ROD ground-water guideline in HZ-C ground water and has been detected above its ROD ground-water guideline for a period of at least 12 months. However, because U-234 exceeds its ROD guideline by less than 1 pCi/L when measurement error is taken into account and the total U concentration is not above the monitoring guideline of 30 µg/L, there is currently no finding of significantly degraded ground-water conditions in HZ-C ground water.

4.1.2 Comparison of Historical Ground-Water Data at the Latty Avenue Properties

Ground-water sampling has been conducted at the Latty Avenue Properties from CY 1984 to the present. The most comprehensive ground-water monitoring program, involving sampling from 18 monitoring wells, was conducted at the site in the summer of CY 1997. Results from subsequent sampling events were used to evaluate contaminant trends at the Latty Avenue Properties during the period from the first quarter of CY 1999 to the fourth quarter of CY 2013. Statistical analysis was used to assist with identifying trends for those contaminants that exceeded the ROD guidelines during CY 2013.

Statistical Method and Trend Analysis

Several statistical methods are available to evaluate contaminant trends in ground water. These include the Mann-Kendall Trend Test, the Wilcoxon Rank Sum (WRS) Test, and the Seasonal Kendall Test (USEPA 2000). The latter two tests are applicable to data that may or may not exhibit seasonal behavior, but generally require larger sample sizes than the Mann-Kendall Trend Test. The Mann-Kendall Trend Test was selected for this project, because this test can be used with small sample sizes (as few as four data points), and because a seasonal variation in concentrations was not indicated by the time-versus-concentration plots at the NC Sites. 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 (DL) can be used (Gibbons 1994). The test can assess whether a time-ordered dataset exhibits an increasing or decreasing trend, within a predetermined level of significance. While the Mann-Kendall Trend Test can use as few as four data points, often this is not enough data to detect a trend. Therefore, the test was performed only at those monitoring stations at the NC Sites for which data have been collected for at least six sampling events.

A customized Microsoft Excel spreadsheet was used to perform the Mann-Kendall Trend Test. The test involves listing the sampling results in chronological order and computing all differences that may be formed between current measurements and earlier measurements. The value of the test statistic (S) is the difference between the number of strictly positive differences and the number of strictly negative differences. If S is a large positive value, then evidence indicates an increasing trend in the data. If S is a large negative value, then evidence indicates a decreasing trend in the data. If no trend exists and all observations are independent, then all rank orderings of the annual statistics are equally likely (USEPA 2000). The results of the Mann-Kendall Trend Test are reported in terms of a p-value or Z-score, depending on sample size, N. If the sample size is less than or equal to 10, then the p-value is computed. If the p value less than or equal to 0.05, the test concludes that the trend is statistically significant. If the p value is greater than 0.05, the test concludes no evidence of a significant trend exists. For dataset sizes larger than 10, the Z-score is compared to ±1.65, which is the comparison level at a 95 percent confidence level. If the Z-score is greater than 1.65, the test concludes that a significant upward trend exists. If the Z-score is less than –1.65, the test concludes that a significant downward trend exists. For Z-scores between –1.65 and 1.65, no evidence of a significant trend exists.

The results of the Mann-Kendall Trend Test are less reliable for datasets containing a high number of non-detects, particularly if the DL changes over time. For that reason, for datasets in which more than 50 percent of the time-series data are non-detect, the Mann-Kendall Trend Test was not conducted. No general consensus exists 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, it is generally valid even in cases in which there are a large number of non-detects.

Only unfiltered data were used, and split and QC sample results were not included in the database for the Mann-Kendall Trend Test. The Mann-Kendall Trend Test is used to evaluate the radiological data and to determine trends without regard to isotopic analysis. In addition, for monitoring wells for which the Mann-Kendall Trend Test has indicated a trend (either upward or downward), another analysis is performed to determine whether the trend is due to inherent error associated with the analytical test method for each sample analysis. This analysis involves graphing the data and the associated error-bar for the specific constituent. Time-concentration plots for arsenic and molybdenum in HW22 and for total U in HISS-01 are provided on Figures 4-3 and 4-4, respectively.

Results of Trend Analysis for Ground Water at the Latty Avenue Properties

For those stations at which an analyte exceeded the ROD guideline at least once during the year and for which sufficient historical data were available to evaluate trends (i.e., at least six samples), statistical trend analysis was conducted to assess whether concentrations of the analyte are increasing (upward trending) or decreasing (downward trending) over time. For the purposes of this trend analysis, a statistically significant trend in concentration is defined as a trend with a confidence level greater than 95 percent. The confidence level denotes the probability that the indicated trend is an actual trend in the data, rather than a result of the random nature of environmental data.

HZ-A Ground Water

The Mann-Kendall Trend Test was performed for those wells in which analytes exceeded the ROD guidelines at least once during CY 2013, for which sufficient data were available (i.e., at least six samples were collected during the period from the first quarter of CY 1999 to the fourth quarter of CY 2013), and at which the percentage of non-detect results is less than or equal to 50 percent. However, for HW22, the time period was limited to CY 2003 through CY 2013 to obtain a dataset for which less than 50 percent of the results were non-detect. Five COCs, (arsenic in HW22, molybdenum in HISS-10 and HW22, U-234 and U-238 in HISS-01 and HISS-10, and total U in HISS-01) were above the ROD guidelines in HZ-A ground water at the Latty Avenue Properties during CY 2013. However, a trend analysis was not conducted for molybdenum in HISS-10, because the frequency of non-detect values in the dataset exceeds 50 percent.

Inorganics

Statistical trend analysis using the Mann-Kendall Trend Test was conducted to confirm whether concentrations of arsenic are increasing or decreasing over time in HW22. The arsenic concentration for the third-quarter CY 2013 sample from HW22 (130 µg/L) was above the ROD guideline for arsenic (2.4 µg/L). As shown in Table 4-4, the Mann-Kendall Trend Test result indicates an increasing trend in arsenic concentrations at HW22 for the period between January of 2003 and December of 2013. The time-versus-concentration plot for arsenic in HW22 is provided on Figure 4-3. As indicated on this figure, during the period between March of 2007 and August of 2009, concentrations of arsenic increased from non-detect levels to an average concentration of 116 µg/L. The increase in arsenic concentrations generally correlates with a decrease in the ORP values as measured in the field and plotted on the secondary axis of Figure 4-3. Redox conditions in this well (as reflected by the ORP values) changed from oxidizing (95 to 262 mV) to reducing (–127 to –189 mV) during the period between March of 2007 and August of 2009. The ORP values suggest that the oxidation/reduction state is a controlling factor for arsenic mobility at HW22 (Kelly et al. 2005). Based on the soil boring log for HW22, iron oxide nodules are present throughout HZ-A. Iron oxides will adsorb or desorb arsenic when redox conditions change (Nguyen et al. 2008). Remediation and restoration activities conducted in the vicinity of HW22 may have resulted in a decrease in surface water recharge (i.e., oxygenated water) to the area, which initiated localized reducing conditions. The reducing conditions may have subsequently led to desorbtion of arsenic from the iron oxide nodules and the elevated levels of arsenic detected in ground-water samples from HW22 after March of 2007. HW22 is located in Tract 3 of VP-40A East. Remediation of Tract 3 was initiated in November 20, 2008, and restoration activities were completed in April of 2009. This time period is consistent with the timing of the increase in arsenic concentrations and the decrease in ORP values reported for the ground-water samples from HW22. The levels of arsenic in CWC surface water and sediment are low and have not increased over the CY 2000 through CY 2013 period, indicating that the increase in arsenic concentration in this well is localized and is not significantly impacting CWC.

Table 4-4. Results of Mann-Kendall Trend Test[a] for Analytes with Concentrations Above the ROD Guidelines at the Latty Avenue Properties During CY 2013

Analyte	Station	N[b]	Test Statistics[c]		Trend[d]
			S	Z	
Arsenic	HW22	13	50	3.09	Upward Trend
Molybdenum	HW22	13	33	2.02	Upward Trend[e]
Total U	HISS-01	31	139	2.35	Upward Trend
	HISS-10	16	50	2.21	Upward Trend[e]

[a] One-tailed Mann-Kendall Trend Tests were performed at a UCL_{95}.
[b] N is the number of unfiltered ground-water sample results for a particular analyte at a well within a specified time period. With the exception of HW22, the time period is between January of 1999 and December of 2013. For HW22, the dataset was restricted to the period between January of 2003 and December of 2013 to meet the Mann-Kendall Trend Test requirement that the dataset have a detection frequency greater than 50 percent.
[c] Test Statistics: S – the S-Statistic; Z – Z-score, or normalized test statistic (for datasets having N>10).
[d] Trend: If N>10, the Z-score is compared to ±1.65 to determine trend significance.
[e] When the measurement error is taken into account, a significant upward trend does not exist.

Additional statistical trend analysis was conducted to confirm whether concentrations of molybdenum are increasing or decreasing over time in HW22. The molybdenum concentration for the third quarter (6.5 µg/L) CY 2013 sample from HW22 was above the ROD guideline (3.4 µg/L). An increasing trend in molybdenum concentrations was observed for HW22 for the period between January of 2003 and December of 2013. Because the Mann-Kendall Trend Test does not consider the effects of measurement error and does not provide any information concerning the magnitude of the trend, a time-versus-concentration plot for molybdenum in HW22 (Figure 4-3) was used to evaluate these factors. The best-fit trend line based on the data scatter is also shown on the graph. When measurement error is taken into account, no trend exists in molybdenum concentrations at HW22. The graph also indicates that the molybdenum concentrations at HW22 during CY 2013 are not above the ROD guideline when associated measurement errors are taken into account.

Radionuclides

The time-versus-concentration plots shown on Figure 4-4 provide an overview of the temporal and spatial variability in the concentrations of total U in ground water at the Latty Avenue Properties. Total U concentrations were calculated using the isotopic U results measured in pCi/L and converted to µg/L using radionuclide-specific activities. The reported values were used for detected and non-detected isotopic values, except in instances in which the value was negative. If the reported value was negative, a value equal to zero was substituted for the result prior to calculating the total U concentration.

Three radiological analytes, (U-234, U-238, and total U) were detected at concentrations above the ROD guidelines in HZ-A well HISS-01 at the Latty Avenue Properties during CY 2013. In addition, U-234 and U-238 concentrations were above the ROD guidelines in HISS-10 during the first quarter CY 2013sampling event. A trend analysis was performed for the total U concentrations for HISS-01 and HISS-10. 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, performance of a separate trend analysis for each of these isotopes was unnecessary. As shown in Table 4-4, a statistically significant increasing trend in total U concentrations was identified for HISS-01 for the 1999 through 2013 dataset. Based on the time-versus-concentration plot for HISS-01 on Figure 4-4, the concentrations were relatively stable prior to 2009, and increased abruptly in February of 2009, possibly as a result of the RA conducted in adjacent areas during this period. Although an overall increasing trend was identified for the entire 1999 through 2013 period, concentrations of total U in HISS-01 have declined from a high of 337 µg/L on May 29, 2009, to 56.5 µg/L on August 28, 2013. An upward trend in total U concentrations was identified for HISS-10 for the period between January 1999 and December 2013. The total U concentrations at HISS-10 for this period have not exceeded the 30 µg/L monitoring guideline. In addition, based on the time-versus-concentration plot for total U in HISS-10 (Figure 4-4), no significant trend exists in total U concentrations at HISS-10 when measurement error is taken into account.

HZ-C Ground Water

A sample from one HZ-C well (HW23) was above the ROD ground-water guideline for U-234 during CY 2013. A trend analysis was not conducted for U-234, because the frequency of non-detected results exceeds 50 percent. Total U concentrations did not exceed the 30 µg/L monitoring guideline in this well, and based on the time-versus-concentration plot for total U shown in Figure 4-4, no trend exists in total U concentrations at HW23. Because the total U values are calculated using the U-234 and U-238 values, the trend in U-234 values at HW23 would be similar to the trend in total U values (i.e., no trend). Therefore, based on the historical data and the time-versus-concentration plot, no significant changes occurred in total U concentrations in HZ-C ground water during CY 2013.

4.1.3 Evaluation of the Potentiometric Surface at the Latty Avenue Properties

Ground-water surface elevations were measured at the Latty Avenue Properties in March, May, August, and December of CY 2013. The potentiometric surface maps for HZ-A and HZ-C created from the May 17 and December 3, 2013, ground-water elevation measurements are provided on Figures 4-5, 4-6, 4-7, and 4-8. The ground-water surface elevations at the Latty Avenue Properties and the SLAPS and SLAPS VPs were mapped on the same figures, because these areas are located in the same ground-water flow regime.

The top of the saturated zone occurs in the low hydraulic conductivity silts and clays of stratigraphic Units 2 and 3T at the Latty Avenue Properties. The potentiometric data indicate near-radial potentiometric surface contour patterns for the HZ-A ground water at the HISS and Futura. Wells HISS-10 and HW22 have the highest potentiometric surface elevations, with lower ground-water elevations measured in the surrounding wells. At the western edge of the site, ground water in the HZ-A zone flows to the west toward CWC. The local horizontal gradient for HZ-A ground water at the HISS and Futura ranged from 0.0107 ft/ft (May) to 0.0070 ft/ft (December) in CY 2013.

The potentiometric surface of the HZ-C ground water at the Latty Avenue Properties is not well defined due to the limited data available for the deeper HZs. Based on measured ground-water elevations in the HZ-C monitoring well HW23 at the Latty Avenue Properties and several HZ-C wells located to the southwest at the SLAPS and SLAPS VPs, the flow direction in the HZ-C ground water is generally toward the east or northeast. The local horizontal gradient for HZ-C is low, ranging from 0.0029 ft/ft (May) to 0.0039 ft/ft (December) in CY 2013.

4.2 ST. LOUIS AIRPORT SITE AND ST. LOUIS AIRPORT SITE VICINITY PROPERTIES

Ground-water monitoring wells have been installed at the SLAPS and SLAPS VPs to characterize the site stratigraphy, ground-water chemistry, and ground-water migration pathways.

Stratigraphy at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

In the vicinity of the SLAPS and the adjacent ballfields, 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) (Figures 4-1, 4-9, and 4-10). 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 HZs (HZ-A through HZ-E) are recognized beneath the SLAPS and SLAPS VPs. HZ-A consists of fill (Unit 1) and the Pleistocene, glacially related sediments of stratigraphic Unit 2, and Subunit 3T. Underlying HZ-A is HZ-B, which consists of highly impermeable clay (Subunit 3M). HZ-C consists of the stratigraphic Subunit 3B and Unit 4. The shale (Unit 5) and limestone (Unit 6) bedrock are recognized as HZ-D and HZ-E, respectively. HZ-E is the protected aquifer for the site.

The shallow (HZ-A) ground-water flow is toward CWC under normal flow conditions. Average depths to the ground-water surface at the site range from near the ground surface during the spring months to approximately 10 ft (3 m) below ground surface (bgs) during the fall months. The dominant flow in HZ-A is through the more permeable Unit 2. Each of the subunits in Unit 3 has lower hydraulic conductivity than Units 1, 2, and 4. Units HZ-B and the Pennsylvanian shale HZ-D limit the passage of ground water vertically beneath the SLAPS and SLAPS VPs. Subunit 3M of HZ-B acts as a vertical barrier to ground-water movement under the western portion of the site. Subunit 3M is a clayey aquitard (unit resisting water passage) that effectively separates the HZ-A ground-water system from the underlying HZ-C and HZ-E. The dominant unit to obtain water in the lower horizon is the sandy, clayey gravel of Unit 4. Unit 4 of HZ-C is used as a surrogate for HZ-E, because water movement within the Mississippian limestone is dependent upon the limestone's joint and solutioned system. In addition, the limestone has exhibited massive characteristics and is very slow to recharge.

Summary of Calendar Year 2013 Ground-Water Monitoring Results at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

Four soil COCs (chromium at B53W06S, B53W09S, B53W13S, and B53W18S; molybdenum at B53W13S and B53W18S; nickel at B53W13S and PW43; and total U at PW46) were above the ROD guidelines in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2013. However, molybdenum at B53W13S and B53W18S and nickel at PW43 did not exceed their ROD guidelines if the associated measurement errors are taken into account. Two inorganic soil COCs (chromium and nickel at B53W13S) had concentrations greater than their ROD guidelines for a period of at least 12 months. Statistically significant increasing trends in chromium and nickel concentrations were observed for B53W13S. In addition, a statistically significant increasing trend in chromium concentrations was observed for B53W06S and B53W09S. 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. However, based on trend analysis, concentrations of total U have not statistically increased in PW46.

Because a significant degrading of CWC surface water has not occurred, currently no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2013. However, because chromium, nickel, and total U levels have been above the ROD guidelines for a period of at least 12 months, ground-water monitoring will continue subject to subsequent 5-year reviews.

One soil COC (nickel) exceeded the ROD guideline in HZ-C through HZ-E ground water in CY 2013. However, the nickel concentration did not exceed its ROD guideline if the associated measurement error is taken into account. Because no soil COCs have statistically increased in ground water (relative to the well's historical data and accounting for uncertainty) for more than a 12-month period, no findings currently indicate significantly degraded ground-water conditions in HZ-C through HZ-E ground water at the SLAPS and SLAPS VPs.

4.2.1 Evaluation of Ground-Water Monitoring Data at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

The purpose of the ground-water monitoring conducted at the SLAPS and SLAPS VPs is specified in the ROD (USACE 2005). Response-action monitoring is currently being conducted in HZ-A and HZ-C to assess the improvement of water quality due to source removals and to document the protection of the limestone aquifer (HZ-E) during the RA.

As noted in Section 4.1.1, the ground-water monitoring data at the SLAPS and SLAPS VPs are evaluated against the requirements for ground-water monitoring identified in the ROD (USACE 2005).

In addition to the previously described monitoring, an evaluation of concentration trends is conducted for the COCs detected above the ROD guidelines in ground water to support assessment of the effectiveness of the RA in the CERCLA 5-year reviews.

Monitoring Well Network at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

The current EMP well network for the SLAPS and SLAPS VPs is shown on Figure 4-11. A summary of the HZ information for the ground-water monitoring wells located at the SLAPS and SLAPS VPs is provided in Table 4-5. HZ-A is considered the upper (or shallow) zone, while HZ-C, HZ-D, and HZ-E have been considered the lower (or deep) zone. This designation of upper and lower zones is separated at Subunit 3M of HZ-B. Fourteen wells are screened exclusively across the shallow zone (HZ-A). Four wells are screened exclusively in the lower zone across HZ-C, HZ-D, and/or HZ-E. The remaining well (PW36) is screened across both HZ-B and HZ-C.

Table 4-5. Ground-Water Monitoring Well Network at the SLAPS and SLAPS VPs During CY 2013

Well ID	Screened HZs			
	HZ-A	HZ-B	HZ-C	HZ-E
B53W01D[a]			X	
B53W01S	X			
B53W06S[a]	X			
B53W07D[a]			X	
B53W07S	X			
B53W09S[a]	X			
B53W13S[a]	X			
B53W17S[a]	X			
B53W18S[a]	X			
B53W19S	X			
MW31-98[a]	X			
MW32-98	X			
PW35[a]				X
PW36		X	X	
PW42			X	
PW43[a]	X			
PW44[a]	X			
PW45[a]	X			
PW46[a]	X			

[a] Wells sampled in CY 2013.

During CY 2013, 13 ground-water wells were sampled for various parameters at the SLAPS and SLAPS VPs. Ground-water samples collected from these wells were analyzed for both radiological and inorganic constituents. Historically, radiological parameters (Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238) and inorganic constituents have been the main focus of the ground-water sampling. In CY 2013, ground-water sampling was conducted on

March 6 and 8 (first quarter); May 20, 21, and 22 (second quarter); August 26 and 28 (third quarter); and December 3 and 4 (fourth quarter).

HZ-A Ground Water

Ten HZ-A wells were sampled at the SLAPS and the adjacent investigation areas during CY 2013 (B53W06S, B53W09S, B53W13S, B53W17S, B53W18S, MW31-98, PW43, PW44, PW45, and PW46). The analytical data for the CY 2013 ground-water sampling at the SLAPS and SLAPS VPs are provided in Appendix E, Table E-4.

The CY 2013 results were compared to ROD guidelines for the soil COCs identified in the ROD (i.e., antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, total U, vanadium, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238). Table 4-6 lists those soil COCs exceeding the ROD guidelines in CY 2013 ground-water samples from HZ-A wells at the SLAPS and SLAPS VPs.

Table 4-6. Analytes Exceeding ROD Guidelines in HZ-A Ground Water at the SLAPS and SLAPS VPs During CY 2013

Analyte	Units	Station	ROD Guidelines[a]	Minimum Detected	Maximum Detected	Mean Detected	No. Detects > ROD Guidelines[a]	Frequency of Detection
Chromium	μg/L	B53W06S	47	32	57	45	1	2/2
		B53W09S	9.6	10[b]	37	24	2	2/2
		B53W13S	9.1	59	83	71	2	2/2
		B53W18S	51	35	140	105	2	3/3
Molybdenum	μg/L	B53W13S	3.2	4.0[b]	5.9[b]	5.0[b]	2	2/2
		B53W18S	28	16	32[b]	25.7	2	3/3
Nickel	μg/L	B53W13S	38	320	470	395	2	2/2
		PW43	3.6	8.2[b]	8.2[b]	8.2[b]	1	1/1
U-234	pCi/L	PW46	5,500	1,000[c]	1,000[c]	1,000[c]	0	1/1
U-235	pCi/L	PW46	290	44.4[c]	44.4[c]	44.4[c]	0	1/1
U-238	pCi/L	PW46	5,600	1,030[c]	1,030[c]	1,030[c]	0	1/1
Total U[d]	μg/L	PW46	30	3,095	3,095	3,095	1	1/1

[a] ROD Guidelines = Response-Action Monitoring Guideline and Total U Monitoring Guideline. Response-Action Monitoring Guideline = 2 x UCL_{95} (based on historical concentrations before RAs were initiated). Total U Monitoring Guideline = 30 μg/L (USACE 2005).

[b] The footnoted results for molybdenum at B53W13S and B53W18S, chromium at B53W09S, and nickel at PW43 did not exceed the ROD guideline if the associated measurement errors are taken into account.

[c] The results for U-234, U-235, and U-238 do not exceed the ROD guidelines. The results are provided, because they were used in the total U calculation.

[d] Total U values were calculated from isotopic concentrations in pCi/L and converted to μg/L using radionuclide-specific activities with the following formula: total U (μg/L) = U-234 (pCi/L)/6240 + U-235 (pCi/L)/2.16 + U-238 (pCi/L)/0.335.

Three inorganic soil COCs (chromium, molybdenum, and nickel) were detected in HZ-A ground water at concentrations above the ROD guidelines at the SLAPS and SLAPS VPs. Chromium was detected at concentrations above the ROD guideline in the second-quarter samples from B53W06S (57 μg/L) and B53W18S (140 μg/L) but was detected at concentrations below the ROD guideline in the fourth-quarter sample from B53W06S (32 μg/L) and the third-quarter sample from B53W18S (35 μg/L). Therefore, chromium concentrations in B53W06S and B53W18S did not exceed the ROD guideline for more than 12 months. Chromium was detected at concentrations above the ROD guideline in the third-quarter sample from B53W09S (37 μg/L). However, because chromium did not exceed the ROD guideline in the first-quarter sample (10 μg/L) if measurement error is taken into account, chromium concentrations in B53W09S have not exceeded the ROD guideline for more than 12 months. Chromium was detected at concentrations above its ROD guideline in the second- and fourth-quarter samples from B53W13S (59 µg/L and 83 µg/L, respectively). Chromium was also detected above the ROD guideline in the prior CY 2012 samples from this well. Therefore, chromium concentrations in B53W13S have exceeded the ROD guideline for more than 12 months.

Molybdenum was detected in B53W13S at levels slightly above the ROD guideline of 3.2 µg/L in the second- and fourth-quarter samples (4 µg/L and 5.9 µg/L, respectively). However, molybdenum concentrations are not above the ROD guideline in B53W13S if the associated measurement error is taken into account. Molybdenum was also detected at concentrations above the ROD guideline of 28 µg/L in the first- and second-quarter samples from B53W18S. The molybdenum concentration was not above the ROD guideline in the CY 2013 third-quarter sampling event and thus did not exceed the guideline for more than 12 months.

Nickel was detected in B53W13S at concentrations above the ROD guideline during the second- and fourth-quarter sampling events in CY 2013. Nickel concentrations were also above the ROD guideline in the samples collected from B53W13S in CY 2012. Therefore, the nickel concentration at B53W13S has been above the ROD guideline for a period of at least 12 months. Nickel was detected in PW43 at levels slightly above the ROD guideline of 3.6 µg/L in the third-quarter sample (8.2 µg/L). However, the nickel concentration is not above the ROD guideline in PW43 if the associated measurement error is taken into account.

One radiological soil COC (total U) exceeded the ROD guideline in HZ-A ground water at the SLAPS and SLAPS VPs. The total U concentration in PW46 (converted from pCi/L to µg/L using the isotopic concentrations and radionuclide-specific activities) exceeded the 30-µg/L guideline during the first-quarter CY 2013 sampling event. The total U concentration in PW46 was 3,095 µg/L on March 8, 2013. PW46 is an RA evaluation well that was installed at the western edge of the SLAPS in April of 2006. Although no ground-water sampling data are available for PW46 prior to May 18, 2006, data are available for the well PW38, which was previously at this location. The ROD guidelines for PW46 were developed using pre-2004 data from PW38. Based on the total U data collected from PW38 prior to its decommissioning in November of 2003, the CY 2013 total U concentration at PW46 is lower than the historical concentrations reported at PW38. Based on the statistical evaluation of trends presented in Section 4.2.2, no increases in the concentrations of total U have occurred in PW46 during CY 2013.

In summary, two inorganic soil COCs (chromium and nickel) were above the ROD guidelines in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2013. Both of these inorganic contaminants have been above the ROD guidelines for a period of at least 12 months in B53W13S. Total U concentrations were above the total U guideline of 30 µg/L in one HZ-A well (PW46) located at the western edge of the SLAPS and have been above the guideline for a period of at least 12 months. However, comparison of their CY 2013 concentrations with historical well data did not indicate that significant degradation of HZ-A ground water is occurring. Because a significant degrading of CWC surface water has not occurred, no findings currently indicate significantly degraded ground-water conditions in HZ-A ground water at the SLAPS and SLAPS VPs in CY 2013. However, because chromium, nickel, and total U levels have been above the ROD guidelines for a period of at least 12 months, monitoring will continue subject to subsequent 5-year reviews.

Lower, HZ-C Through HZ-E, Ground Water

Three wells (B53W01D, B53W07D, and PW35) screened across lower ground water (HZ-C through HZ-E) were sampled at the SLAPS and SLAPS VPs during CY 2013. Table 4-7 lists those soil COCs exceeding the ROD guidelines in CY 2013 ground-water samples from wells screened across the lower ground-water at the SLAPS and SLAPS VPs.

Comparison of the data to the ROD guidelines indicates that nickel at B53W07D was above the ROD guideline in HZ-C through HZ-E ground water in CY 2013. However, the nickel concentration at B53W07D did not exceed the ROD guideline if the associated measurement error is taken into account. Therefore, the CY 2013 HZ-C through HZ-E ground-water data from the SLAPS and SLAPS VPs do not indicate the occurrence of significant degradation of lower ground water.

Table 4-7. Analytes Exceeding ROD Ground-Water Criteria in HZ-C Ground Water at the SLAPS and SLAPS VPs During CY 2013

Analyte	Units	Station	ROD Ground-Water Criteria[a]	Minimum Detected	Maximum Detected	Mean Detected	No. Detects > ROD Ground-Water Criteria[a]
Nickel	μg/L	B53W07D	12	16[b]	16[b]	16[b]	1

[a] ROD ground-water guidelines include the response-action monitoring guidelines and the total U monitoring guideline of 30 μg/L. Response-action monitoring guideline = 2 x UCL_{95}, based on historical concentrations before RAs were initiated (USACE 2005).
[b] The results for nickel at B53W07D did not exceed the ROD guideline if the associated measurement errors are taken into account.

4.2.2 Comparison of Historical Ground-Water Data at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

Results of ground-water sampling conducted between CY 1998 though CY 2013 indicated that various inorganics and radionuclides have been detected above the ROD guidelines in HZ-A ground water at the SLAPS and SLAPS VPs. Statistical analysis was used to identify trends for those contaminants that exceeded these guidelines during CY 2013. The statistical method used to evaluate the trends, the Mann-Kendall Trend Test, is described in Section 4.1.2. Filtered data, split samples, and field duplicates were not included in the analysis. For datasets in which 50 percent or more of the time-series data are non-detect, the Mann-Kendall Trend Test was not performed.

Results of Trend Analysis at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

The evaluation of historical trends for ground water at the SLAPS and SLAPS VPs focuses on those contaminants that exceeded the ROD guidelines in samples collected during CY 2013. For those monitoring wells at which an analyte exceeded these guidelines in one or more samples during CY 2013 and the historical dataset had a detection frequency greater than 50 percent and a sample size of at least six, a statistical trend analysis was conducted to assess whether concentrations of the analyte are increasing (upward trending) or decreasing (downward trending) over time. For the purposes of this report, a statistically significant trend in concentration is defined as a trend with a confidence level greater than 95 percent. Because the Mann-Kendall Trend Test does not consider the effects of measurement error and does not provide any information concerning the magnitude of trends, time-concentration plots were used to evaluate these factors.

Based on the CY 2013 ground-water monitoring data for the SLAPS and SLAPS VPs, four soil COCs (chromium, molybdenum, nickel, and total U) exceeded the ROD guidelines in HZ-A ground water in CY 2013. To aid in the evaluation of trends, time-versus-concentration plots for chromium, molybdenum, nickel, and total U are provided on Figures 4-12 through 4-16. The Mann-Kendall Trend Test was performed for chromium in B53W06S, B53W09S, B53W13S, and B53W18S; nickel in B53W13S; and total U in PW46. Trend analysis was not performed for molybdenum in B53W13S or B53W18S, because molybdenum did not exceed ROD guidelines if associated measurement errors are taken into account.

Trend analysis was not performed for deep (HZ-C through HZ-E) ground water, because nickel in B53W07D did not exceed the ROD guideline if associated measurement error is taken into account. The remaining COCs did not exceed the ROD guidelines in deep ground water during CY 2013.

<u>Inorganics</u>

The Mann-Kendall Trend Test was performed for chromium (B53W06S, B53W09S, B53W13S and B53W18S) and nickel (B53W13S). The results of the Mann-Kendall Trend Tests are provided in Table 4-8. As shown in Table 4-8, a statistically significant increasing trend in chromium concentrations (i.e., a trend with a confidence level greater than 95 percent) was observed for B53W06S, B53W09S, B53W13S and B53W18S. In addition, statistically significant increasing trends were observed for nickel concentrations at B53W13S. Because the Mann-Kendall trend test does not consider the effects of measurement error and does not provide any information concerning the magnitude of the trend, time-versus-concentration plots of chromium, molybdenum and nickel (provided in Figures 4-12, 4-13, and 4-14, respectively) were used to evaluate these factors. The best-fit trend lines based on the data scatter are also shown on the graphs on these figures.

Table 4-8. Results of Mann-Kendall Trend Test[a] for Analytes with Concentrations Above ROD Guidelines in Ground Water at the SLAPS and SLAPS VPs During CY 2013

Analyte	Station	N[b]	Test Statistics[c]		Trend[d]
			S	Z	
Chromium	B53W06S	15	51	2.47	Upward Trend
	B53W09S	17	80	3.30	Upward Trend
	B53W13S	22	165	4.64	Upward Trend
	B53W18S	17	41	1.66	Upward Trend
Nickel	B53W13S	22	142	3.99	Upward Trend
Total U	PW46	14	5	0.22	No Trend

[a] One-tailed Mann-Kendall Trend Tests were performed at a 95-percent level of confidence.
[b] N is the number of unfiltered ground-water sample results for a particular analyte for the period between January of 1999 and December of 2013 for B53W06S, B53W09S, B53W13S, and B53W18S, and between May of 2006 and December of 2013 for PW46.
[c] Test Statistics: S – the S-Statistic; Z – Z-score, or normalized test statistic (used if N>10).
[d] Trend: If N>10, the Z-score is compared to ±1.64 to determine trend significance.

<u>Radionuclides</u>

A statistical evaluation of historical uranium concentrations has been conducted using total U concentrations. Total U values were calculated from isotopic concentrations in pCi/L and converted to μg/L using radionuclide-specific activities. The Mann-Kendall trend test was performed for total U in the one HZ-A well (PW46) having levels above the 30-μg/L ROD guideline in CY 2013. The results of the Mann-Kendall trend test are provided in Table 4-8. The

Mann-Kendall Trend Test results indicate no trend for total U in PW46. A graph of time-versus-total-U concentrations for PW46 is shown on Figure 4-15. PW46 was installed in April of 2006 near the former location of PW38 and is screened across the same interval. For comparison purposes, the PW38 data collected between March of 2000 and November of 2003 is also shown on the graph of PW46 data on Figure 4-15. As indicated on the graph, total U concentrations in PW46 have decreased from the levels reported at PW38 prior to installation of PW46. Time-versus-concentration graphs for total U for some of the wells sampled in CY 2013 at the SLAPS and SLAPS VPs are provided on Figure 4-16.

4.2.3 Evaluation of Potentiometric Surface at the St. Louis Airport Site and St. Louis Airport Site Vicinity Properties

Ground-water surface elevations were measured from wells at the SLAPS and SLAPS VPs in March, May, August, and December of CY 2013. Ground-water elevation contours were drawn using the May 17, 2013, and December 3, 2013, measurements to provide a comparison of the ground-water flow conditions during periods of high and low ground-water elevations, respectively. The potentiometric surface maps, shown on Figures 4-5 through 4-8, were developed for both HZ-A and HZ-C ground-water zones. The ground-water flow direction is interpreted to be perpendicular to the ground-water equipotential contours.

In May and December of CY 2013, the ground-water flow direction in the HZ-A ground water at the SLAPS and adjacent SLAPS VP Ballfields was northwesterly toward CWC (Figures 4-5 and 4-7). In the eastern portion of the SLAPS, the average horizontal hydraulic gradient ranges from 0.005 ft/ft (May 17, 2013) to 0.008 ft/ft (December 3, 2013). The hydraulic gradient increases near CWC, where the average horizontal gradient ranges from 0.024 ft/ft (May 17, 2013) to 0.011 ft/ft (December 3, 2013). The unconfined HZ-A ground water is interpreted to discharge into CWC, which divides the HZ-A ground-water system south and east of the creek from areas north and west of CWC. Ground-water recharge comes from three primary sources: precipitation, off-site inflow of ground water, and creek bed infiltration during high creek stage. Ground-water discharge could occur by seepage into CWC during low creek stage (DOE 1994). The vertical gradient varies beneath the site and is influenced by stratigraphic heterogeneity and seasonal fluctuations in recharge and evapotranspiration. Based on the CY 2013 water-level measurements, the position of the HZ-A ground-water surface averages approximately 4.1 ft (1.2 m) higher in the corresponding shallow wells at the SLAPS and SLAPS VPs in the wet season (May) than in the dry season (December).

A review of the screened intervals in the deep wells indicates that many wells are screened across multiple lithologic units and HZs. Based on this review, the HZ-C (Units 3B and 4) potentiometric surface was determined to be a proper representation of the lower ground-water system. This review reduces the number of data points used to develop the potentiometric surface contours but results in a higher level of confidence in contouring the HZ-C potentiometric surface.

The potentiometric surface contours for the HZ-C ground water in CY 2013 are illustrated on Figures 4-6 and 4-8. The flow in HZ-C is generally east or northeast, at an average horizontal gradient of 0.0029 ft/ft in May of 2013 and 0.0039 ft/ft in December of 2013. A comparison of the ground-water elevations from monitoring well pairs indicates that the wells completed in HZ-A exhibit different hydraulic heads from the wells completed in HZ-C. Near CWC, the potentiometric surface of the “confined” aquifer HZ-C (ranging in elevation between approximately 514 and 516 ft [156.7 and 157.3 m] amsl) is higher than the potentiometric surface of the unconfined HZ-A zone, indicating an upward vertical gradient. The large difference in hydraulic head demonstrates that the HZ-A and HZ-C ground-water zones are distinct ground-water systems with limited hydraulic connection. This is supported by the lithologic data, which indicate that a highly impermeable clay (Subunit 3M of HZ-B) and silty clay (Subunit 3B of HZ-C) separates the HZ-A ground-water system from the underlying ground-water zones. The HZ-C potentiometric surfaces do not appear to be influenced by CWC (the creek's thalweg is about 500 ft [152.4 m] amsl) or by seasonal changes. These features are likely a result of the overlying clay layers limiting vertical ground-water movement.

5.0 ENVIRONMENTAL QUALITY ASSURANCE PROGRAM

5.1 PROGRAM OVERVIEW

The environmental quality assurance (QA) program includes management of the QA/QC programs, plans, and procedures governing environmental monitoring activities at all St. Louis Sites (SLS) and at subcontracted vendor laboratories. This section discusses the environmental monitoring standards of the FUSRAP and the goals for these programs, plans, and procedures.

The environmental QA program provides the FUSRAP with reliable, accurate, and precise monitoring data. The program furnishes guidance and directives to detect and prevent problems from the time a sample is collected until the associated data are evaluated. The MDNR conducted site visits to observe the environmental monitoring activities. USEPA and MDNR regulatory oversight of sampling activities provided an additional level of QA/QC.

Key elements in achieving the goals of this program are maintaining compliance with the QA program, personnel training, compliance assessments, use of QC samples, documentation of field activities and laboratory analyses, and a review of data documents for precision, accuracy, and completeness.

General objectives are as follows:

- To provide data of sufficient quality and quantity to support ongoing remedial efforts, aid in defining potential COCs, meet the requirements of the EMG and the SAG, and support the ROD (USACE 1999a, 2000, 2005).
- To provide data of sufficient quality to meet applicable State of Missouri and federal concerns (e.g., reporting requirements).
- To ensure samples were collected using approved techniques and are representative of existing site conditions.

5.2 QUALITY ASSURANCE PROGRAM PLAN

The Quality Assurance Program Plan (QAPP) for activities performed at the NC Sites is described within Section 3.0 of the SAG. The QAPP provides the organization, objectives, functional activities, and specific QA/QC activities associated with investigations and sampling activities at the NC Sites.

QA/QC procedures are performed in accordance with applicable professional technical standards, USEPA requirements, government regulations and guidelines, and specific project goals and requirements. The QAPP was prepared in accordance with USEPA and USACE guidance documents, including *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (USEPA 1991), *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (USEPA 1994), and *Requirements for the Preparation of Sampling and Analysis Plans,* Engineer Manual (EM) 200-1-3 (USACE 2001).

5.3 SAMPLING AND ANALYSIS GUIDE

The SAG summarizes standard operating procedures (SOPs) and data quality requirements for collecting and analyzing environmental data. The SAG integrates protocols and methodologies identified under various USACE and regulatory guidance. It describes administrative procedures for managing environmental data and governs sampling plan preparation, data review, evaluation and validation, database administration, and data archiving. The structure for identified sampling/monitoring was delineated through programmatic documents such as the EMG (USACE 1999a) for the NC Sites, which is an upper-tier companion document to the SAG (USACE 2000). The EMICY13 outlines the analyses to be performed at the NC Sites for various media (USACE 2012).

Flexibility to address non-periodic environmental sampling, such as specific studies regarding environmental impacts, well installations, and/or in-situ waste characterizations, was accomplished by the issuance of work descriptions. Environmental monitoring data obtained during these sampling activities were reported to the USEPA, Region VII, on a quarterly basis per the FFA requirements.

5.4 FIELD SAMPLE COLLECTION AND MEASUREMENT

Prior to beginning field sampling, field personnel were trained, as necessary, and participated in a project-specific readiness review. These activities ensured that standard procedures were followed in sample collection and in completing field logbooks, chain-of-custody forms, labels, and custody seals. Documentation of training and readiness were submitted to the project file.

The master field investigation documents are the site field logbooks. The primary purpose of these documents is to record daily field activities; personnel on each sampling team; and any administrative occurrences, conditions, or activities that may have affected the fieldwork or data quality of any environmental samples for a given day. Guidance for documenting specific types of field sampling activities in field logbooks or log sheets is provided in Appendix C of *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3 (USACE 2001).

At any point in the process of sample collection or data and document review, a non-conformance report may be initiated if non-conformances are identified (SAIC 2002). Data entered into the database may be flagged accordingly.

5.5 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities are conducted to verify that sampling and analysis activities were performed in accordance with the procedures established in the SAG and activity-specific work description or Environmental Monitoring Implementation for Calendar Year (EMICY) documents.

5.5.1 Field Assessments

Internal assessments (audit or surveillance) of field activities (sampling and measurements) are conducted by the QA/QC Officer (or designee). Assessments include an examination of field sampling records, field instrument operating records, sample collection, handling and packaging procedures, maintenance of QA procedures, and chain-of-custody forms. These assessments occurred at the onset of the project to verify that all established procedures were followed (systems audit).

Performance assessments followed the system audits to ensure that deficiencies had been corrected and to verify that QA practices/procedures were being maintained throughout the duration of the project. These assessments involved reviewing field measurement records, instrumentation calibration records, and sample documentation.

External assessments may be conducted at the discretion of the USACE; USEPA, Region VII; or the State of Missouri.

5.5.2 Laboratory Audits

The onsite laboratories are subject to USACE periodic review(s) by the local USACE Chemist to demonstrate compliance with the *Department of Defense Quality Systems Manual (DOD QSM)* Version 4.2 (DOD 2010). In conjunction, blind third-party performance evaluation studies (performance audits) are participated in at least twice per year, and results are reported to the local USACE point(s) of contact. In addition, contract laboratories are required to be an accredited laboratory under the Department of Defense (DOD) Environmental Laboratory Accreditation Program (ELAP). The DOD ELAP requires an annual audit and re-accreditation every 3 years.

These system audits include examining laboratory documentation of sample receipt, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, and instrument operating records. Performance audits consist of USACE laboratories receiving performance evaluation samples from an outside vendor for an ongoing assessment of laboratory precision and accuracy. The analytical results of the analysis of performance evaluation samples are evaluated by USACE Hazardous, Toxic, and Radioactive Waste – Center of Expertise and/or a local oversight chemist to ensure that laboratories maintain acceptable performance.

Internal performance and system audits of laboratories were conducted by the Laboratory QA Manager as directed in the *Laboratory Quality Assurance Plan for the FUSRAP St. Louis Radiological Laboratory* (USACE 2013). These system audits included an examination of laboratory documentation of sample receipt, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, and instrument operating records against the requirements of the laboratory's SOPs. Internal performance audits were also conducted on a regular basis. Single-blind performance samples were prepared and submitted along with project samples to the laboratory for analysis. The Laboratory QA Manager evaluated the analytical results of these single-blind performance samples to ensure that the laboratory maintained acceptable performance. Quarterly QA/QC reports are generated and provided to the local USACE authority; these reports document the ongoing QC elements and allow further monitoring of quality processes/status. In addition, QA plans and methodology are to follow the guidance as presented in the *DOD QSM* (DOD 2010).

5.6 SUBCONTRACTED LABORATORY PROGRAMS

All samples collected during environmental monitoring activities were analyzed by USACE-approved laboratories. QA samples collected for ground water and sediment were analyzed by the designated USACE QA laboratory. Each laboratory supporting this work maintained statements of qualifications including organizational structure, QA manual, and SOPs. Additionally, subcontracted laboratories were also required to be an accredited laboratory under the DOD ELAP.

Samples collected during these investigations were analyzed by USEPA SW-846 methods and other documented USEPA or nationally recognized methods. Laboratory SOPs are based on the methods as published by the USEPA in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846* (USEPA 1993).

5.7 QUALITY ASSURANCE AND QUALITY CONTROL SAMPLES

The QA and QC samples were analyzed for the purpose of assessing the quality of the sampling effort and the reported analytical data. The QA and QC samples include duplicate samples (–1) and split samples (–2). The equations utilized for accuracy and precision can be found in Section 5.9.

5.7.1 Duplicate Samples

These samples, which measure precision, were collected by the sampling teams and were submitted for analysis to the on-site laboratory or contract laboratories. The identity of duplicate samples is held blind to the analysts. The purpose of these samples is to provide activity-specific, field-originated information regarding the homogeneity of the sampled matrix and the consistency of the sampling effort. These samples were collected concurrently with the primary environmental samples and equally represent the medium at a given time and location. Duplicate samples were collected from each medium addressed by this project and were submitted to the contracted laboratories for analysis. One duplicate sample was collected for approximately every 20 field samples of each matrix and analyte across the SLS. Precision is measured by the relative percent difference (RPD) for radiological and by non-radiological analyses or the normalized absolute difference (NAD) for radiological analyses.

The non-radiological analyses RPDs are presented in Tables 5-1 and 5-2. The radiological analyses RPDs and NADs are presented in Tables 5-3 through 5-5. The overall precision for CY 2013 environmental monitoring sampling activities was acceptable. See Section 5.9 for the evaluation process.

Table 5-1. Non-Radiological Duplicate Sample Analysis for CY 2013 – Surface and Ground Water[a]

Sample Name	Antimony	Arsenic	Barium	Cadmium	Chromium
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152884 / CWC152884-1	NC	0.00	0.00	NC	NC
CWC165458 / CWC165458-1	NC	3.39	0.00	NC	NC
HIS152043 / HIS152043-1	NC	NC	9.52	8.70	NC
	Molybdenum	**Nickel**	**Selenium**	**Thallium**	**Vanadium**
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152884 / CWC152884-1	0.00	3.77	29.89	NC	NC
CWC165458 / CWC165458-1	0.00	0.00	NC	NC	NC
HIS152043 / HIS152043-1	4.88	0.00	4.26	NC	NC

[a] RPD criterion for liquid samples is less than or equal to 30 percent.
-1 Sample Duplicate
NC Not calculated due to one or both concentrations being below DLs.

Table 5-2. Non-Radiological Duplicate Sample Analysis for CY 2013 – Sediment[a]

Sample Name[b]	Antimony	Arsenic	Barium	Cadmium	Chromium
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152885 / CWC152885-1	NC	26.09	1.20	NC	19.35
CWC165459 / CWC165459-1	NC	32.73	16.00	**133.93**	12.77
	Molybdenum	**Nickel**	**Selenium**	**Thallium**	**Vanadium**
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152885 / CWC152885-1	NC	7.41	NC	NC	12.50
CWC165459 / CWC165459-1	21.28	**87.10**	30.43	NC	43.59

[a] RPD criterion for solid matrix samples is less than or equal to 50 percent.
[b] Results reported in milligrams per kilogram (mg/kg).
-1 Sample Duplicate
NC Not calculated due to one or both concentrations being below MDCs.
Bold Values exceed the control limits. Values not in bold are within control limits.

Table 5-3. Radiological Duplicate Sample Analysis for CY 2013 – Surface and Ground Water[a]

Sample Name	Radium-226		Radium-228		Thorium-228		Thorium-230	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152884 / CWC152884-1	NC	NA	*	*	NC	NA	20.07	NA
CWC165458 / CWC165458-1	NC	NA	*	*	NC	NA	NC	NA
HIS152043 / HIS152043-1	NC	NA	*	*	NC	NA	NC	NA
	Thorium-232		Uranium-234		Uranium-235		Uranium-238	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152884 / CWC152884-1	NC	NA	54.14	0.47	NC	NA	66.38	0.65
CWC165458 / CWC165458-1	NC	NA	NC	NA	NC	NA	NC	NA
HIS152043 / HIS152043-1	NC	NA	9.44	NA	NC	NA	10.01	NA

[a] RPD criterion for liquid samples is less than or equal to 30 percent. If the RPD is greater than 30 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
-1 Sample Duplicate
NC Not calculated due to one or both concentrations being below MDCs.
NA Not applicable; see RPD.
* Not calculated because either parent or split sample was not analyzed.

Table 5-4. Radiological Duplicate Sample Alpha Analysis for CY 2013 – Sediment[a]

Sample Name[b]	Thorium-228[b]		Thorium-230[b]		Thorium-232[b]	
	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-1	41.24	NA	17.19	NA	5.93	NA
CWC165459 / CWC165459-1	13.10	0.19	40.22	NA	49.78	NA

[a] RPD criterion for solid matrix samples is less than or equal to 50 percent. If the RPD is greater than 50 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
[b] Results from alpha spectroscopy.
-1 Sample Duplicate
NA Not applicable; see RPD.

Table 5-5. Radiological Duplicate Sample Gamma Analysis for CY 2013 – Sediment[a]

Sample Name	Actinium-227		Americium-241		Cesium-137		Potassium-40	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-1	NC	NA	NC	NA	NC	NA	6.06	NA
CWC165459 / CWC165459-1	NC	NA	NC	NA	NC	NA	0.81	NA
	Protactinium-231		Radium-226		Radium-228		Thorium-228	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-1	NC	NA	7.34	NA	5.53	NA	5.53	NA
CWC165459 / CWC165459-1	NC	NA	3.15	NA	11.91	NA	11.91	NA
	Thorium-230		Thorium-232		Uranium-235		Uranium-238	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-1	NC	NA	5.53	NA	NC	NA	21.08	NA
CWC165459 / CWC165459-1	NC	NA	11.91	NA	NC	NA	43.13	NA

[a] RPD criterion for solid matrix samples is less than or equal to 50 percent. If the RPD is greater than 50 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
-1 Sample Duplicate
NC Not calculated due to one or both concentrations being below MDCs.
NA Not applicable; see RPD.

5.7.3 Split Samples

Split samples measure accuracy and were collected by the sampling team and sent to a USACE QA laboratory for analysis to provide an independent assessment of contractor and subcontractor laboratory performance. One split sample was collected for approximately every 20 field samples of each matrix for non-radiological and for radiological analytes across the SLS.

The non-radiological analysis RPDs are presented in Tables 5-6 and 5-7. The radiological analyses RPDs and NADs are presented in Tables 5-8 through 5-10. The overall accuracy for the CY 2013 environmental monitoring sampling activities was acceptable. See Section 5.9 for the evaluation process.

Table 5-6. Non-Radiological Split Sample Analysis for CY 2013 – Surface and Ground Water

Sample Name	Antimony	Arsenic	Barium	Cadmium	Chromium
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152884 / CWC152884-2	NC	NC	21.40	NC	NC
CWC165458 / CWC165458-2	NC	NC	7.55	NC	NC
HIS152043 / HIS152043-2	NC	NC	16.22	NC	NC
	Molybdenum	**Nickel**	**Selenium**	**Thallium**	**Vanadium**
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152884 / CWC152884-2	**81.23**	**129.87**	**162.41**	NC	NC
CWC165458 / CWC165458-2	12.50	**73.97**	NC	NC	NC
HIS152043 / HIS152043-2	**100.00**	NC	**189.09**	NC	NC

-2 Sample Split
NC Not calculated due to one or both concentrations being below MDCs.
Bold Values exceed the control limits. Values not in bold are within control limits.

Table 5-7. Non-Radiological Split Sample Analysis for CY 2013 – Sediment[a]

Sample Name	Antimony	Arsenic	Barium	Cadmium	Chromium
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152885 / CWC152885-2	NC	47.62	18.58	NC	43.48
CWC165459 / CWC165459-2	NC	**128.63**	**67.99**	**79.70**	13.59
	Molybdenum	**Nickel**	**Selenium**	**Thallium**	**Vanadium**
	RPD	**RPD**	**RPD**	**RPD**	**RPD**
CWC152885 / CWC152885-2	NC	10.22	NC	NC	39.24
CWC165459 / CWC165459-2	**90.66**	**60.22**	**90.91**	NC	**70.51**

[a] RPD Criterion for solid matrix samples is less than or equal to 50 percent.
-2 Sample Split
NC Not calculated due to one or both concentrations being below MDCs.
Bold Values exceed the control limits. Values not in bold are within control limits.

Table 5-8. Radiological Split Sample Analysis for CY 2013 – Surface and Ground Water[a]

Sample Name	Radium-226		Radium-228		Thorium-228		Thorium-230	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152884 / CWC152884-2	NC	NA	*	*	NC	NA	NC	NA
CWC165458 / CWC165458-2	NC	NA	*	*	NC	NA	65.85	0.51
HIS152043 / HIS152043-2	NC	NA	*	*	NC	NA	126.41	1.09
	Thorium-232		Uranium-234		Uranium-235		Uranium-238	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152884 / CWC152884-2	NC	NA	81.88	1.14	NC	NA	27.95	NA
CWC165458 / CWC165458-2	NC	NA	53.92	0.50	NC	NA	43.67	0.47
HIS152043 / HIS152043-2	NC	NA	18.00	NC	NC	NA	19.18	NA

[a] RPD criterion for liquid samples is less than or equal to 30 percent. If the RPD is greater than 30 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
-2 Sample Split
NC Not calculated due to one or both concentrations being below MDCs.
NA Not applicable; see RPD.
* Not calculated because either parent or split sample was not analyzed.

Table 5-9. Radiological Split Sample Alpha Analysis for CY 2013 – Sediment[a]

Sample Name[a]	Thorium-228		Thorium-230		Thorium-232	
	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-2	17.65	NA	52.02	1.01	71.22	1.09
CWC165459 / CWC165459-2	29.11	NA	37.57	NA	60.91	1.08

[a] RPD criterion for solid matrix sample is less than or equal to 50 percent. If the RPD is greater than 50 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
-2 Sample Split
NA Not applicable; see RPD.

Table 5-10. Radiological Split Sample Gamma Analysis for CY 2013 – Sediment[a]

Sample Name	Actinium-227		Americium-241		Cesium-137		Potassium-40	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-2	NC	NA	NC	NA	NC	NA	2.65	NA
CWC165459 / CWC165459-2	NC	NA	NC	NA	NC	NA	9.36	NA
	Protactinium-231		Radium-226		Radium-228		Thorium-228	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-2	NC	NA	0.00	NA	8.58	NA	*	*
CWC165459 / CWC165459-2	NC	NA	12.03	NA	38.64	NA	*	*
	Thorium-230		Thorium-232		Uranium-235		Uranium-238	
	RPD	NAD	RPD	NAD	RPD	NAD	RPD	NAD
CWC152885 / CWC152885-2	*	*	8.58	NA	NC	NA	NC	NA
CWC165459 / CWC165459-2	*	*	38.64	NA	NC	NA	NC	NA

[a] RPD criterion for solid matrix samples is less than or equal to 50 percent. If the RPD is greater than 50 percent, then the NAD shall be less than or equal to 1.96 to remain within the control limits.
-2 Sample Split
NC Not calculated due to one or both concentrations being below MDCs.
NA Not applicable; see RPD.
* Not calculated because either parent or split sample was not analyzed.

5.7.4 Equipment Rinsate Blanks

Equipment rinsate blank samples are typically taken from the rinsate water collected from equipment decontamination activities. These samples consist of analyte-free water that has been rinsed over sampling equipment for the purposes of evaluating the effectiveness of equipment decontamination. Because all of the monitoring wells have dedicated sampling equipment, equipment rinsate blanks were not employed to assess the effectiveness of the decontamination process, because no potential for contamination existed.

Sediment samples from CWC are collected from each station using a clean sampling spoon. These spoons are segregated after use and decontaminated at the SLAPS field trailer according to Field Technical Procedure 405, *Cleaning and Decontaminating Sample Containers and Sampling Equipment* (SAIC 2000). Because the process of collecting sediment occurs below the surface of the water, a rinsate blank would not represent the wetted surface of the sampling spoon at the time of sample collection and, therefore, would not apply. The CWC surface water samples are collected using new nitrile gloves and new laboratory sample containers. Therefore, equipment rinsate blanks for these samples are also not required, because no contamination potential exists.

5.8 DATA REVIEW, EVALUATION, AND VALIDATION

All data packages received from the analytical laboratory were reviewed and either evaluated or validated by data management personnel. Data validation is the systematic process of ensuring that the precision and accuracy of the analytical data are adequate for their intended use. Validation was performed in accordance with USEPA regional or National Functional Guidelines or project-specific guidelines. General chemical data quality management guidance found in Engineer Regulation 1110-1-263 (USACE 1998c) was also used when planning for chemical data management and evaluation. Additional details of data review, evaluation, and validation are provided in the *FUSRAP Laboratory Data Management Process for the St. Louis Site* (USACE 1999b). Data assessment guidance, to determine the usability of data from hazardous, toxic, and radioactive waste projects, was provided in EM 200-1-6 (USACE 1997).

One hundred percent of the data generated from all analytical laboratories was independently reviewed and either evaluated or validated. The data review process documents the possible effects on the data that result from various QC failures; it does not determine data usability, nor does it include assignment of data validation qualifier (VQ) flags. The data evaluation process uses the results of the data review to determine the usability of the data. The process of data evaluation summarizes the potential effects of QA/QC failures on the data, and the District Chemist or District Health Physicist assesses their impact on the attainment of the project-specific data quality objectives (DQOs). Consistent with the data quality requirements, as defined in the DQOs, approximately 10 percent of all project data was validated.

5.9 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS, AND SENSITIVITY

The data evaluation process considers precision, accuracy, representativeness, completeness, comparability, and sensitivity. The following sub-sections will provide detail to the particular parameters and how the data were evaluated for each, with discussion and tables to present the associated data.

Accuracy and precision can be measured by the RPD or the NAD using the following equations:

$$RPD = \left(\frac{[S - D]}{\frac{S+D}{2}} \right) x\ 100$$

$$NAD = \frac{|S - D|}{\sqrt{U_S^2 + U_D^2}}$$

where:

S = Parent Sample Result
D = Duplicate/Split Sample Result
U_S = Parent Sample Uncertainty
U_D = Duplicate/Split Sample Uncertainty

The RPD is calculated for all samples for which a detectable result is reported for both the parent and the QA field split or field duplicate. For surface and ground-water radiological samples, when the RPD is greater than 30 percent, the NAD is used to determine the accuracy or precision of the method. NAD accounts for uncertainty in the results; RPD does not. The NAD should be equal to or less than a value of 1.96. The RPD criterion for sediment samples is equal to 50 percent. Neither equation is used when the analyte in one or both of the samples is not detected. In cases in which neither equation can be used, the comparison is counted as acceptable in the overall number of comparisons.

Precision is a measure of mutual agreement among individual measurements performed under the same laboratory controls. To evaluate for precision, a field duplicate is submitted to the same laboratory as the original sample to be analyzed under the same laboratory conditions.

The RPD and NAD between the two results was calculated and used as an indication of the precision of the analyses performed (Tables 5-3, 5-4, and 5-5). Sample collection precision was measured in the laboratory by the analyses of duplicates. With the exception of a few outliers, which were qualified accordingly, the overall precision for the CY 2013 environmental monitoring sampling activities was acceptable.

Accuracy provides a gauge or measure of the agreement between an observed result and the true value for an analysis. The RPD and NAD between the two results was calculated and used as an indication of the accuracy of the analyses performed (Tables 5-8, 5-9, and 5-10). For this report, accuracy is measured through the use of the field split samples through a comparison of the prime laboratory results versus the results of an independent laboratory. The overall accuracy for CY 2013 environmental monitoring sampling activities was acceptable.

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocols. Representativeness is satisfied through proper design of the sampling network, use of proper sampling techniques, following proper analytical procedures, and not exceeding holding times of the samples.

Representativeness was determined by assessing the combined aspects of the QA program, QC measures, and data evaluations. The network design was developed from the EMICY13; the sampling protocol from the SAG has been followed; and analytical procedures were conducted within the bounds of the QAPP. The overall representativeness of the CY 2013 environmental monitoring sampling activities was acceptable for the media and the media's sampling previously listed in this document.

Comparability expresses the confidence with which one dataset can be compared with another. The extent to which analytical data will be comparable depends upon the similarity of sampling and analytical methods, as well as sample-to-sample and historical comparability. Standardized and consistent procedures used to obtain analytical data are expected to provide comparable results. These most recent (post CY 1997) analytical data, however, may not be directly comparable to data collected before CY 1997 because of differences in DQOs. Some media, such as storm water, and radiological monitoring have values that are primarily useful in the present and the comparison to historical data is not as relevant. The overall comparability of the applicable environmental monitoring sampling data met the project DQOs.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. Laboratories are expected to provide data meeting QC acceptance criteria for all samples tested. For the CY 2013 environmental monitoring sampling activities, the data completeness was 100 percent (FUSRAP DQO for completeness is 90 percent).

Sensitivity is the determination of minimum detectable concentration (MDC) values that allows the investigation to assess the relative confidence that can be placed in a value in comparison to the magnitude or level of analyte concentration observed. For this report, MDC is a term generically used to represent both the method detection limit (MDL) for non-radiologicals and the minimum detectable activity (MDA) for radiological analytes. The closer a measured value comes to the MDC, the less confidence and more variation the measurement will have. Project sensitivity goals were expressed as quantitation level goals in the SAG. These levels were achieved or exceeded throughout the analytical process.

The MDC is reported for each result obtained by laboratory analysis. These very low MDCs are achieved through the use of gamma spectroscopy for all radionuclides of concern, with additional analyses from alpha spectroscopy for thorium and from inductively coupled plasma (ICP) for metals. Variations in MDCs for the same radiological analyte reflect variability in the detection efficiencies and conversion factors due to factors such as individual sample aliquot, sample density, and variations in analyte background radioactivity for gamma and alpha spec, at the laboratory. Variations in MDLs for the same non-radiological analyte reflect variability in calibrations between laboratories, dilutions, and analytical methods. In order to complete the data evaluation (i.e. precision, accuracy, representativeness, and comparability), analytical results that exceed the MDC of the analyte are desired.

5.10 DATA QUALITY ASSESSMENT SUMMARY

The overall quality of the data meets the established project objectives. Through proper implementation of the project data review, evaluation, validation, and assessment process, project information has been determined to be acceptable for use.

Data, as presented, have been qualified as usable, but estimated when necessary. Data that have been estimated have concentrations/activities that are below the quantitation limit or are indicative of accuracy, precision, or sensitivity being less than desired but adequate for interpretation.

These data can withstand scientific scrutiny, are appropriate for the intended purpose, and are technically defensible. The environmental information presented has an established confidence, which allows utilization for the project objectives and provides data for future needs.

5.11 RESULTS FOR PARENT SAMPLES AND THE ASSOCIATED DUPLICATE AND SPLIT SAMPLES

Summaries of the QA parent sample results and associated duplicate and/or split sample results are presented in Tables 5-11 through 5-14.

Table 5-11. Non-Radiological Parent Samples and Associated Duplicate and Split Samples (Surface and Ground Water) for CY 2013[a]

Sample Name[b]	Antimony			Arsenic			Barium			Cadmium			Chromium		
	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ
CWC152884	1.70	1.70	U	2.30	1.20	=	150.00	0.22	=	0.10	0.10	U	3.30	3.30	U
CWC152884-1	1.70	1.70	U	2.30	1.20	=	150.00	0.22	=	0.10	0.10	U	3.30	3.30	U
CWC152884-2	44.80	5.00	=	5.00	5.00	U	121.00	1.00	=	1.00	1.00	U	5.00	5.00	U
CWC152885	1.80	1.80	U	3.90	.91	=	83.00	0.71	J	0.29	0.29	U	14.00	.88	=
CWC152885-1	1.80	1.80	U	3.00	.91	=	84.00	0.72	J	0.29	0.29	U	17.00	.89	=
CWC152885-2	1.00	1.00	U	2.40	1.00	J	100.00	0.50	=	0.50	0.50	UJ	9.00	1.00	=
CWC152885-2	1.70	1.70	U	3.00	1.20	=	110.00	0.22	=	0.10	0.10	U	3.30	3.30	U
CWC165458-1	1.70	1.70	U	2.90	1.20	=	110.00	0.22	=	0.11	0.10	J	3.30	3.30	U
CWC165458-2	5.00	5.00	J	7.00	7.00	U	102.00	0.50	=	0.50	0.40	U	26.00	10.00	=
CWC165459	1.10	1.10	U	32.00	1.80	=	270.00	0.64	=	0.93	0.11	=	22.00	3.10	J
CWC165459-1	1.20	1.20	U	23.00	2.00	=	230.00	0.71	=	4.70	0.12	=	25.00	3.40	J
CWC165459-2	1.19	1.00	=	6.95	1.00	=	133.00	0.10	J	0.40	0.10	-	19.00	1.00	=
HIS152043	1.70	1.70	U	1.20	1.20	U	100.00	0.22	=	0.12	0.10	=	3.30	3.30	U
HIS152043-1	1.70	1.70	U	1.20	1.20	U	110.00	0.22	=	0.11	0.10	=	3.30	3.30	U
HIS152043-2	4.00	3.00	J	9.00	2.00	J	85.00	1.00	=	1.00	1.00	U	1.00	1.00	U
	Molybdenum			**Nickel**			**Selenium**			**Thallium**			**Vanadium**		
	Result	**DL**	**VQ**	**Result**	**DL**	**VQ**	**Result**	**DL**	**VQ**	**Result**	**DL**	**VQ**	**Result**	**DL**	**VQ**
CWC152884	8.70	1.00	=	2.70	0.40	=	5.00	1.60	=	0.55	0.55	U	2.40	2.40	U
CWC152884-1	8.70	1.00	=	2.60	0.40	=	3.70	1.60	=	0.55	0.55	U	2.40	2.40	U
CWC152884-2	20.60	2.00	=	12.70	2.00	=	48.20	10.00	=	5.00	5.00	U	17.90	5.00	J
CWC152885	2.90	2.90	U	13.00	0.64	=	0.83	0.83	U	4.30	4.30	U	17.00	3.60	=
CWC152885-1	2.90	2.90	U	14.00	0.65	=	0.83	0.83	U	4.40	4.40	U	15.00	3.60	=
CWC152885-2	0.98	0.50	=	14.00	1.00	=	1.00	1.00	U	1.00	1.00	U	25.30	1.00	=
CWC165458	15.00	1.00	=	2.30	0.40	=	2.80	1.60	=	0.55	0.55	U	2.40	2.40	U
CWC165458-1	15.00	1.00	=	2.30	0.40	=	1.60	1.60	=	0.55	0.55	U	2.40	2.40	U
CWC165458-2	17.00	5.00	=	5.00	5.00	J	5.00	5.00	U	7.00	7.00	U	8.00	8.00	U
CWC165459	2.10	0.84	=	35.00	0.73	=	3.90	1.10	U	1.00	1.00	U	61.00	5.00	=
CWC165459-1	2.60	0.93	=	89.00	0.80	=	5.30	1.20	=	1.10	1.10	U	95.00	5.50	=
CWC165459-2	0.79	0.50	=	18.80	0.50	=	10.40	1.00	=	1.29	1.00	=	29.20	1.00	=
HIS152043	21.00	1.00	=	1.10	0.40	=	2.30	1.60	=	0.55	0.55	U	2.40	2.40	U
HIS152043-1	20.00	1.00	=	1.10	0.40	=	2.40	1.60	=	0.55	0.55	U	2.40	2.40	U
HIS152043-2	63.00	1.00	=	1.00	1.00	U	82.00	5.00	=	3.00	3.00	U	12.00	3.00	=

[a] Results are expressed in pCi/L.
[b] Samples ending in “-1” are duplicate samples. Samples ending in “-2” are split samples.
VQ symbols indicate: “=” for positively identified results, “U” for not detected, “J” analyte was identified as estimated quantity, and “UJ” analyte was not detected and had QC deficiencies.

Table 5-12. Non-Radiological Parent Samples and Associated Duplicate and Split Samples (Sediment) for CY 2013[a]

Sample Name[b]	Antimony			Arsenic			Barium			Cadmium			Chromium		
	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ
CWC152885	1.80	1.80	U	3.90	0.91	=	83.00	0.71	J	0.29	0.29	U	14.00	0.88	=
CWC152885-1	1.80	1.80	U	3.00	0.91	=	84.00	0.72	J	0.29	0.29	U	17.00	0.89	=
CWC152885-2	1.00	1.00	U	2.40	1.00	J	100.00	0.50	=	0.50	0.50	UJ	9.00	1.00	=
CWC165459	1.10	1.10	U	32.00	1.80	=	270.00	0.64	=	0.93	0.11	=	22.00	31.0	J
CWC165459-1	1.20	1.20	U	23.00	2.00	=	230.00	0.71	=	4.70	0.12	=	25.00	3.40	J
CWC165459-2	1.19	1.00	=	6.95	1.00	=	133.00	0.10	J	0.40	0.10	=	19.20	1.00	=
	Molybdenum			Nickel			Selenium			Thallium			Vanadium		
	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ	Result	DL	VQ
CWC152885	2.90	2.90	U	13.00	0.64	=	0.83	0.83	U	4.30	4.30	U	17.00	3.60	=
CWC152885-1	2.90	2.90	U	14.00	0.65	=	0.83	0.83	U	4.40	4.40	U	15.00	3.60	=
CWC152885-2	0.98	0.50	=	14.40	1.00	=	1.00	1.00	U	1.00	1.00	U	25.30	1.00	=
CWC165459	2.10	0.84	=	35.00	0.73	=	3.90	1.10	=	1.00	1.00	U	61.00	5.00	=
CWC165459-1	2.60	0.93	=	89.00	0.80	=	5.30	1.20	=	1.10	1.10	U	95.00	5.50	=
CWC165459-2	0.79	0.50	=	18.80	0.50	=	10.40	1.00	=	1.29	1.00	=	29.20	1.00	=

[a] Results are expressed in mg/kg.
[b] Samples ending in “-1” are duplicate samples. Samples ending in “-2” are split samples.
VQ symbols indicate: “=” for positively identified results, “U” for not detected, and “J” analyte was identified as estimated quantity.

Table 5-13. Radiological Parent Samples and Associated Duplicate and Split Samples (Surface and Ground Water) for CY 2013[a]

Sample Name[b]	Radium-226				Radium-228				Thorium-228				Thorium-230			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152884	0.30	0.60	1.20	UJ	*	*	*	*	0.37	0.38	0.25	UJ	0.74	0.54	0.25	J
CWC152884-1	0.85	0.85	0.57	UJ	*	*	*	*	0.20	0.29	0.67	UJ	0.91	0.62	0.27	J
CWC152884-2	0.20	0.14	0.20	UJ	*	*	*	*	-0.13	0.10	0.67	UJ	0.11	0.29	0.61	UJ
CWC152885	*	*	*	*	*	*	*	*	0.97	0.44	0.21	J	2.18	0.70	0.11	J
CWC152885-1	*	*	*	*	*	*	*	*	1.48	0.58	0.13	=	2.59	0.83	0.13	J
CWC152885-2	*	*	*	*	*	*	*	*	0.82	0.44	0.12	J	1.28	0.55	0.07	=
CWC165458	1.24	1.25	1.93	UJ	*	*	*	*	0.26	0.26	0.18	UJ	0.33	0.30	0.18	J
CWC165458-1	0.20	0.64	1.49	UJ	*	*	*	*	0.18	0.26	0.42	UJ	0.39	0.36	0.43	U
CWC165458-2	0.17	0.08	0.09	=	*	*	*	*	-0.10	0.16	0.34	UJ	0.17	0.12	0.16	J
CWC165459	*	*	*	*	*	*	*	*	1.09	0.51	0.33	=	2.15	0.76	0.25	J
CWC165459-1	*	*	*	*	*	*	*	*	0.96	0.48	0.26	J	1.43	0.60	0.14	J
CWC165459-2	*	*	*	*	*	*	*	*	0.81	0.20	0.08	=	1.47	0.27	0.06	=
HIS152043	0.68	0.97	1.68	UJ	*	*	*	*	0.16	0.23	0.22	UJ	0.72	0.49	0.22	J
HIS152043-1	1.20	1.09	1.31	U	*	*	*	*	0.29	0.30	0.43	UJ	0.32	0.29	0.35	U
HIS152043-2	0.10	0.10	0.14	U	*	*	*	*	0.04	0.10	0.19	UJ	0.16	0.13	0.08	J
	Thorium-232				Uranium-234				Uranium-235				Uranium-238			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152884	0.00	0.00	0.25	U	0.40	0.36	0.22	J	0.00	0.0.24	0.72	UJ	0.47	0.40	0.21	J
CWC152884-1	0.00	0.00	0.27	U	0.69	51	0.23	J	0.11	0.21	0.29	UJ	0.95	0.61	0.23	J
CWC152884-2	-0.04	0.05	0.48	UJ	0.95	0.31	0.13	J	0.05	0.09	0.13	UJ	0.63	0.26	0.14	J
CWC152885	1.31	.51	0.11	J	*	*	*	*	*	*	*	*	*	*	*	*
CWC152885-1	1.39	0.56	0.13	J	*	*	*	*	*	*	*	*	*	*	*	*
CWC152885-2	0.62	0.37	0.05	J	*	*	*	*	*	*	*	*	*	*	*	*
CWC165458	-0.03	0.07	0.39	UJ	0.74	0.58	0.29	J	0.00	0.00	0.35	U	0.94	0.67	0.28	J
CWC165458-1	0.00	0.00	0.19	U	0.24	0.28	0.22	UJ	0.00	0.00	0.27	U	0.24	0.28	0.21	UJ
CWC165458-2	0.05	0.12	0.22	UJ	0.42	0.22	0.19	J	0.03	0.07	0.15	UJ	0.61	0.26	0.13	=
CWC165459	1.42	0.59	0.13	=	*	*	*	*	*	*	*	*	*	*	*	*
CWC165459-1	0.85	0.0.45	0.26	J	*	*	*	*	*	*	*	*	*	*	*	*
CWC165459-2	0.76	0.19	0.03	=	*	*	*	*	*	*	*	*	*	*	*	*
HIS152043	0.08	0.16	0.22	UJ	6.66	2.00	0.21	=	0.00	0.00	0.26	U	5.77	1.80	0.21	=
HIS152043-1	-0.03	0.06	0.35	UJ	7.32	2.25	0.24	=	-0.49	0.51	0.65	UJ	5.22	1.77	0.53	=
HIS152043-2	0.00	0.01	0.17	UJ	5.56	0.80	0.10	=	0.21	0.14	0.06	J	4.76	0.72	0.05	=

[a] Results are expressed in pCi/L. Negative results are less than the laboratory system's background level.
[b] Samples ending in "-1" are duplicate samples. Samples ending in "-2" are split samples.
* Not available because sample was not analyzed.
VQ symbols indicate: "=" for positively identified results, "U" for not detected, "J" analyte was identified as estimated quantity, and "UJ" analyte was not detected and had QC deficiencies.

Table 5-14. Radiological Parent Samples and Associated Duplicate and Split Samples (Sediment) for CY 2013[a]

Sample Name[b]	Thorium-228[c]				Thorium-230[c]				Thorium-232[c]			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152885	0.97	0.44	0.21	J	2.18	0.70	0.11	J	1.31	0.51	0.11	J
CWC152885-1	1.48	0.58	0.13	=	2.59	0.83	0.13	J	1.39	0.56	0.13	J
CWC152885-2	0.82	0.44	0.12	J	1.28	0.55	0.07	=	0.62	0.37	0.05	J
CWC165459	1.09	0.51	0.33	=	2.15	0.76	0.25	J	1.42	0.59	0.13	=
CWC165459-1	0.96	0.48	0.26	J	1.43	0.60	0.14	J	0.85	0.45	0.26	J
CWC165459-2	0.81	0.20	0.08	=	1.47	0.27	0.06	=	0.76	0.19	0.03	=
	Actinium-227				Americium-241				Cesium-137			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152885	0.02	0.18	0.29	UJ	0.01	0.04	0.06	UJ	0.02	0.02	0.03	UJ
CWC152885-1	-0.11	0.14	0.21	UJ	0.03	0.03	0.05	UJ	-0.02	0.02	0.02	UJ
CWC152885-2	-0.58	0.63	1.03	UJ	0.04	0.17	0.29	UJ	0.01	0.07	0.12	UJ
CWC165459	0.03	0.09	0.16	UJ	0.01	0.02	0.04	UJ	0.00	0.01	0.01	UJ
CWC165459-1	-0.04	0.10	0.16	UJ	0.01	0.03	0.04	UJ	0.02	0.01	0.02	UJ
CWC165459-2	0.07	0.39	1.55	UJ	0.00	0.14	0.29	UJ	0.01	0.05	0.08	UJ
	Potassium-40				Protactinium-231				Radium-226			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152885	15.30	1.76	0.28	=	0.43	0.51	0.80	UJ	1.13	0.34	0.07	=
CWC152885-1	14.40	1.63	0.23	=	0.21	0.43	0.67	UJ	1.05	0.31	0.06	=
CWC152885-2	14.90	2.55	0.89	=	0.38	0.34	3.53	U	1.13	0.25	0.19	=
CWC165459	12.30	0.83	0.11	=	-0.06	0.28	0.40	UJ	1.25	0.31	0.04	=
CWC165459-1	12.40	0.85	0.10	=	0.07	0.31	0.47	UJ	1.29	0.32	0.04	=
CWC165459-2	11.20	1.93	0.40	=	0.37	0.61	2.26	UJ	1.41	0.26	0.14	=
	Radium-228				Thorium-228[c]				Thorium-230[c]			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152885	0.99	0.10	0.10	=	0.99	0.10	0.10	=	2.04	3.84	5.88	UJ
CWC152885-1	0.93	0.08	0.08	=	0.93	0.08	0.08	=	-0.48	3.34	4.99	UJ
CWC152885-2	0.90	0.28	0.41	=	*	*	*	*	*	*	*	*
CWC165459	0.62	0.04	0.05	=	0.62	0.04	0.05	=	1.43	2.38	3.58	UJ
CWC165459-1	0.69	0.05	0.05	=	0.69	0.05	0.05	=	1.58	2.34	3.81	UJ
CWC165459-2	0.91	0.28	0.23	=	*	*	*	*	*	*	*	*
	Thorium-232[c]				Uranium-235				Uranium-238			
	Result	Error	MDC	VQ	Result	Error	MDC	VQ	Result	Error	MDC	VQ
CWC152885	0.99	0.10	0.10	=	0.07	0.21	0.35	UJ	0.73	0.63	0.58	J
CWC152885-1	0.93	0.08	0.08	=	-0.05	0.19	0.30	UJ	0.59	0.51	0.49	J
CWC152885-2	0.90	0.28	0.41	=	0.04	0.30	0.55	UJ	0.70	0.84	2.83	UJ
CWC165459	0.62	0.04	0.05	=	0.06	0.13	0.22	UJ	1.04	0.44	0.35	=
CWC165459-1	0.69	0.05	0.05	=	-0.01	0.13	0.22	UJ	0.67	0.39	0.37	J
CWC165459-2	0.91	0.28	0.23	=	0.03	0.20	0.55	UJ	0.83	0.52	2.44	U

[a] Results are expressed in mg/kg. Negative results are less than the laboratory system's background level.
[b] Samples ending in "-1" are duplicate samples. Samples ending in "-2" are split samples.
[c] Results from alpha spectroscopy.
* Not available because sample was not analyzed.
VQ symbols indicate: "=" for positively identified results, "U" for not detected, "J" analyte was identified as estimated quantity, and "UJ" analyte was not detected and had QC deficiencies.

6.0 RADIOLOGICAL DOSE ASSESSMENT

This section evaluates the cumulative dose to a hypothetically impacted individual from exposure to radiological contaminants at the NC Sites and documents dose trends. The regulatory dose limit for members of the public is 100 mrem/yr, as stated in 10 *CFR* 20.1301. Although 10 *CFR* 20.1301 is not an ARAR for the NC Sites, the USACE has provided this evaluation to assess public exposures from FUSRAP cleanup operations. Compliance with the dose limit in §20.1301 can be demonstrated in one of the two following methods [§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 NC Sites FUSRAP cleanup operations does not exceed the annual dose limit (i.e., 100 mrem/yr); or
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.

The USACE has elected to demonstrate compliance by calculation of the TEDE to a hypothetical individual likely to receive the highest dose from NC Sites operations (previously listed method 1). This section describes the methodology employed for this evaluation.

Dose calculations are presented for hypothetical maximally exposed individuals at the SLAPS and SLAPS VPs and CWC. The monitoring data used in the dose calculations are reported in the respective environmental monitoring sections of this report.

Dose calculations related to airborne emissions, as required by 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)*, are presented in Appendix A (the "North St. Louis County FUSRAP Sites 2013 Radionuclide Emissions NESHAP Report").

6.1 SUMMARY OF ASSESSMENT RESULTS AND DOSE TRENDS

- No excavation or loadout activities occurred on Latty Avenue Properties, and soil cleanup activities on the most contaminated Latty Avenue Properties (HISS and Futura) were completed in CY 2011. Additionally, the TEDE from Latty Avenue Properties to a hypothetical maximally exposed receptor was indistinguishable from background radiation dose after the cleanup concluded on Latty Avenue Properties. Therefore, calculation of TEDE from Latty Avenue Properties to a hypothetical maximally exposed receptor will not be included in the current and future reports unless excavation or loadout activities occur on those properties.
- The TEDE from the SLAPS and SLAPS VPs to a hypothetical maximally exposed individual from all complete/applicable pathways combined was less than 0.1 mrem/yr, estimated for an individual who works full time at a location approximately 1,640 ft (500 m) west-southwest from the center of the SLAPS Loadout area.
- The TEDE from CWC to a hypothetical maximally exposed individual from all complete/applicable pathways combined was 0.2 mrem/yr, estimated for a youth spending time as a recreational user of CWC.

Annual dose trends from CY 2000 to CY 2013 at applicable NC Sites are documented on Figure 6-1. A comparison of the maximum annual dose from CY 2000 to CY 2013 at each of the applicable NC Sites to the annual average natural background dose of approximately 300 mrem/yr is provided on Figure 6-2.

6.2 PATHWAY ANALYSIS

The six complete pathways for exposure from radiological contaminants evaluated by the St. Louis FUSRAP EMP are listed in Table 6-1. These pathways are used to identify data gaps in the EMP and to estimate potential radiological exposures from the site. Of the six complete pathways, four were applicable in CY 2013 and were thus incorporated into radiological dose estimates.

Table 6-1. Complete Radiological Exposure Pathways for the NC Sites

Exposure Pathway	Pathway Description	Applicable to CY 2013 Dose Estimate	
		SLAPS	Coldwater Creek
Liquid A	Ingestion of ground water from local wells down-gradient from the site.	N	N
Liquid B	Ingestion of fish inhabiting CWC.	NC	N
Liquid C	Ingestion of surface water[a] and sediments.	NC	Y[b]
Airborne A	Inhalation of particulates dispersed through wind erosion and RAs.	Y	NC
Airborne B	Inhalation of Rn-222 and decay products emitted from contaminated soils/wastes.	Y	NC
External	Direct gamma radiation from contaminated soils/wastes.	Y	N

a Surface water includes storm-water run-off from NC Sites, MSD discharges, and the water in CWC.
b The pathway is only applicable to a recreational receptor (youth) exposed to contaminants present in CWC water and sediments. Data from NC Sites storm-water discharges and MSD discharges are not applicable to the hypothesized recreational receptor; therefore, those data are not evaluated in this section.
NC Not a complete pathway for the respective site.
N Not applicable for the site.
Y Applicable for the site.

In developing specific elements of the St. Louis FUSRAP EMP, potential exposure pathways of the radioactive materials present on site are reviewed to determine which pathways are complete. Evaluation of each exposure pathway is based on hypothesized sources, release mechanisms, types, probable environmental fates of contaminants, and the locations and activities of potential receptors. Pathways are then reviewed to determine whether a link exists between one or more radiological contaminant sources, or between one or more environmental transport processes, to an exposure point at which human receptors are present. If a link exists, the pathway is termed complete. Each complete pathway is reviewed to determine whether a potential for exposure was present during CY 2013. If a potential exposure was determined to be possible, the pathway is termed applicable. Only applicable pathways are considered in estimates of dose.

The pathways that are applicable to the CY 2013 dose estimates for NC Sites, including CWC, are shown in Table 6-1. The pathways that are not complete were not considered in the dose assessment and are only listed in Table 6-1 because they were complete for at least one receptor location. The pathways listed as not applicable were listed as such in CY 2013 for the following reasons:

- Liquid A is not applicable because the aquifer is of naturally low quality, and it is not known to be used for any domestic purpose in the vicinity of the NC Sites (DOE 1994).
- Liquid B is not applicable at CWC or for the SLAPS transient receptor, because the receptor would be unlikely to catch and eat a game fish. A survey was conducted, and 97 percent of the fish collected at CWC during the survey (Parker and Szlemp 1987) were fathead minnows.
- The dose equivalent from CWC to the receptor from contaminants in the water/sediment was estimated by using the Microshield Version 5.03 computer-modeling program. The scenario used was a youth playing in the creek bed (1 ft [0.3 m] of water shielding and dry) for 52 hours per year. The highest estimated whole body dose to the youth was 0.3 microrem per year. Therefore, the external gamma pathway (from contaminants in the creek water/sediment) is not applicable for the CWC receptor, because the gamma dose rate emitted from the contaminants is indistinguishable from background gamma radiation.

6.3 EXPOSURE SCENARIOS

Dose calculations were performed for maximally exposed individuals at critical receptor locations for applicable exposure pathways (see Table 6-1) to assess dose due to radiological releases from the NC Sites. First, conditions were set to determine the TEDE to a maximally exposed individual at each of the main site locations on which excavation and loadout activities occurred (SLAPS and SLAPS VPs). A second dose equivalent for CWC was calculated. A third set of dose equivalent calculations was performed to meet NESHAP requirements (Appendix A). These were also used for purposes of TEDE calculation.

The scenarios and models used to evaluate these radiological exposures are conservative but appropriate. Although radiation doses can be calculated or measured for individuals, it is not appropriate to predict the health risk to a single individual using the methods prescribed here. Dose equivalents to a single individual are estimated by hypothesizing a maximally exposed individual and placing this individual in a reasonable but conservative scenario. This method is acceptable when the magnitude of the dose to a hypothetical maximally exposed individual is small, as is the case for the NC Sites. This methodology provides for reasonable estimates of potential exposure to the public and maintains a conservative approach. The scenarios and resulting estimated doses are outlined in Section 6.4.

All ingestion calculations were performed using the methodology described in International Commission on Radiation Protection Reports 26 and 30 for a 50-year committed effective dose equivalent (CEDE). Fifty-year CEDE conversion factors were obtained from the USEPA *Federal Guidance Report,* No. 11 (USEPA 1989b).

6.4 DETERMINATION OF TOTAL EFFECTIVE DOSE EQUIVALENT FOR EXPOSURE SCENARIOS

TEDE for the exposure scenarios were calculated using CY 2013 monitoring data. Calculations for dose scenarios are provided in Appendix G. Dose equivalent estimates are well below the standards set by the NRC for annual public exposure and USEPA NESHAP limits.

The CY 2013 TEDEs for hypothetical maximally exposed individuals near the SLAPS and SLAPS VPs and CWC are less than 0.1 mrem/yr and 0.2 mrem/yr, respectively. In comparison, the annual average exposure to natural background radiation in the United States results in a TEDE of approximately 300 mrem/yr (NCRP 2009). Assumptions are detailed in the following sections.

6.4.1 Radiation Dose Equivalent from Latty Avenue Properties to a Maximally Exposed Individual

There were no excavation or loadout activities in the Latty Avenue Properties during CY 2013; therefore, dose from the Latty Avenue properties is considered negligible (Leidos 2014b).

6.4.2 Radiation Dose Equivalent from St. Louis Airport Site/St. Louis Airport Site Vicinity Properties to a Maximally Exposed Individual

The SLAPS and SLAPS VPs contributing to dose (i.e., those properties at which RA occurred in CY 2013) include: the Ballfields, VP-16, and the SLAPS Loadout. This section discusses the estimated TEDE to a hypothetical maximally exposed individual assumed to frequent the perimeter of the SLAPS and SLAPS VPs and to receive a radiation dose by the exposure pathways identified previously. No private residences are adjacent to the site. Therefore, all calculations of dose equivalent due to the applicable pathway assume a realistic residence time that is less than 100 percent. A full-time-employee business receptor was considered to be the maximally exposed individual from the SLAPS and SLAPS VPs.

The exposure scenario assumptions follow.

- Exposure to radiation from all SLAPS sources occurs to the maximally exposed individual while working full time outside at the receptor location facility located approximately 1,640 ft (500 m) west-southwest from the center of the SLAPS Loadout area. Exposure time is 2,000 hours per year (Leidos 2014c).
- Exposure from external gamma radiation was calculated using environmental TLD monitoring data at the perimeter between the source and the receptor. The site is assumed to represent a line-source to the receptor.
- Exposure from airborne radioactive particulates was calculated by using soil concentration data and air particulate monitoring data to determine a source term and then running the CAP-88 PC modeling code to calculate dose to the receptor (Leidos 2014c).
- Exposure from Rn-222 (and progeny) was calculated using a dispersion factor and Rn-222 (alpha track) monitoring data at the site perimeter between the source and the receptor (Leidos 2014c).

Based on the exposure scenario and assumptions described previously, a maximally exposed individual working outside at the receptor facility 1,640 ft (500 m) west-southwest of the center of the SLAPS Loadout area received less than 0.1 mrem/yr from external gamma, less than 0.1 mrem/yr from airborne radioactive particulates, and 0 mrem/yr from Rn-222 for a TEDE of less than 0.1 mrem/yr (Leidos 2014c).

6.4.3 Radiation Dose Equivalent from Coldwater Creek to a Maximally Exposed Individual

This section discusses the estimated TEDE to a hypothetical maximally exposed individual assumed to frequent CWC and receive a radiation dose by the exposure pathways identified previously. The assumed scenario is for a recreational user. Therefore, all calculations of dose equivalent due to the applicable pathway assume a realistic residence time that is less than 100 percent. A youth spending time as a recreational user of CWC is considered to be the maximally exposed individual from CWC.

The exposure scenario assumptions follow.

- The youth spends 2 hours at CWC during each visit, and visits once every 2 weeks. It is likely that this activity would be greater in summer and less in winter, but the yearly average is 26 visits.
- The soil/sediment ingestion rate is 50 milligrams (mg) per day, and water ingestion rate is 2 liters (L) per day (USEPA 1989c).
- The UCL_{95} of the mean radionuclide concentrations in CWC surface water/sediment samples collected in CY 2013 were assumed to be present in the water/sediment ingested by the maximally exposed individual (Leidos 2014d).
- Dose equivalent conversion factors for ingestion are: total U, 2.50E-5 millirem per picocurie (mrem/pCi); Ra-226, 1.33E-3 mrem/pCi; Ra-228, 1.44E-3 mrem/pCi; Th-228, 3.96E-4 mrem/pCi; Th-230, 5.48E-4 mrem/pCi; and Th-232, 2.73E-3 mrem/pCi (USEPA 1989b).

Based on the exposure scenario and assumptions described previously, a maximally exposed individual using CWC for recreational purposes received less than 0.1 mrem/yr from soil/sediment ingestion and 0.2 mrem/yr from water ingestion, for a TEDE of 0.2 mrem/yr (Leidos 2014d).

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FIGURES

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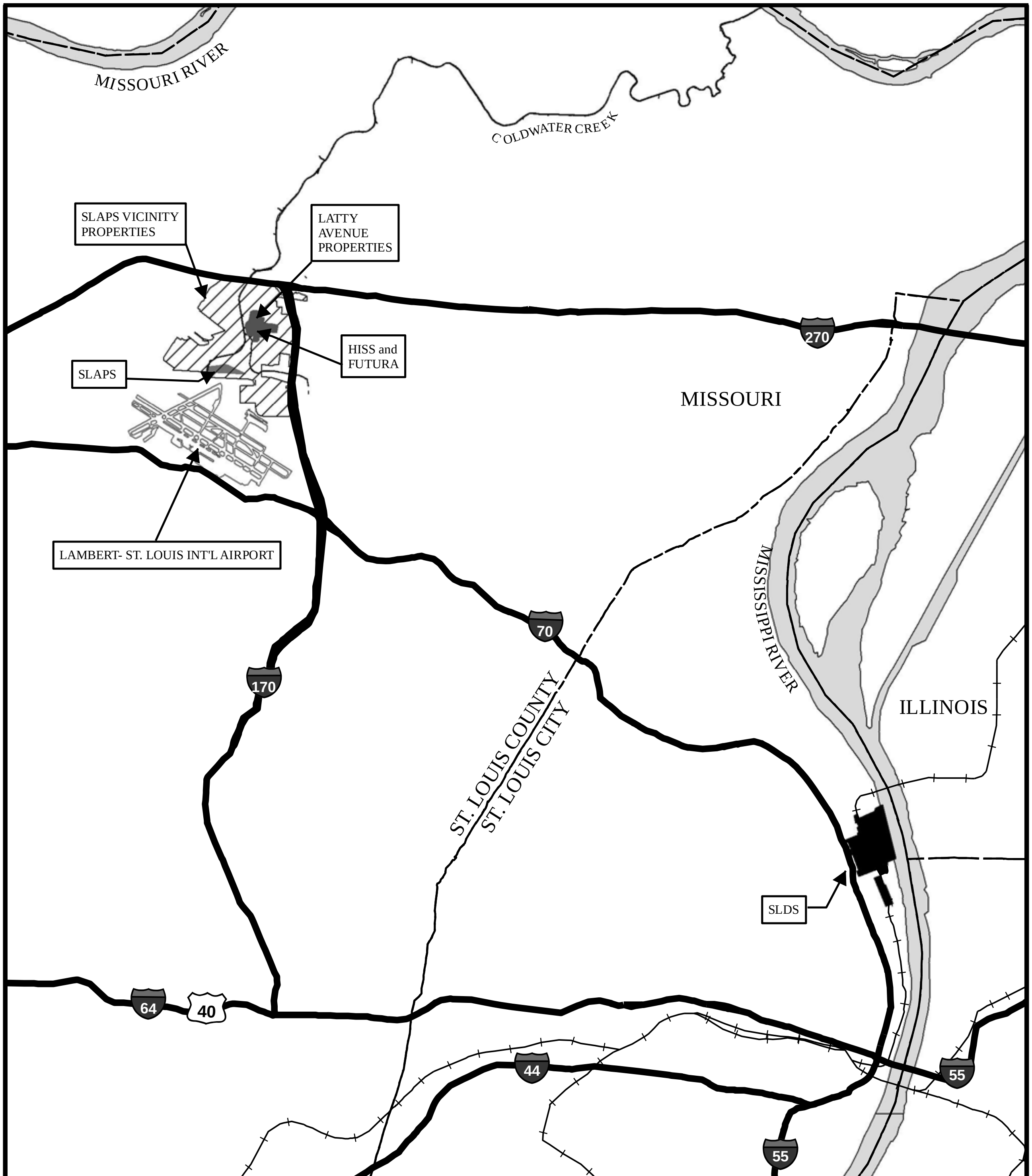

LEGEND:

- Interstate
- US Highway
- Railroad
- North St. Louis County Sites
- Airfield
- SLDS
- SLAPS & HISS/Futura
- River/Stream

N W E S

MO-East State Plane
(NAD 83, Feet)

0 5,500 11,000 Feet

Figure 1-1.
Location Map of the
St. Louis Sites

FUSRAP

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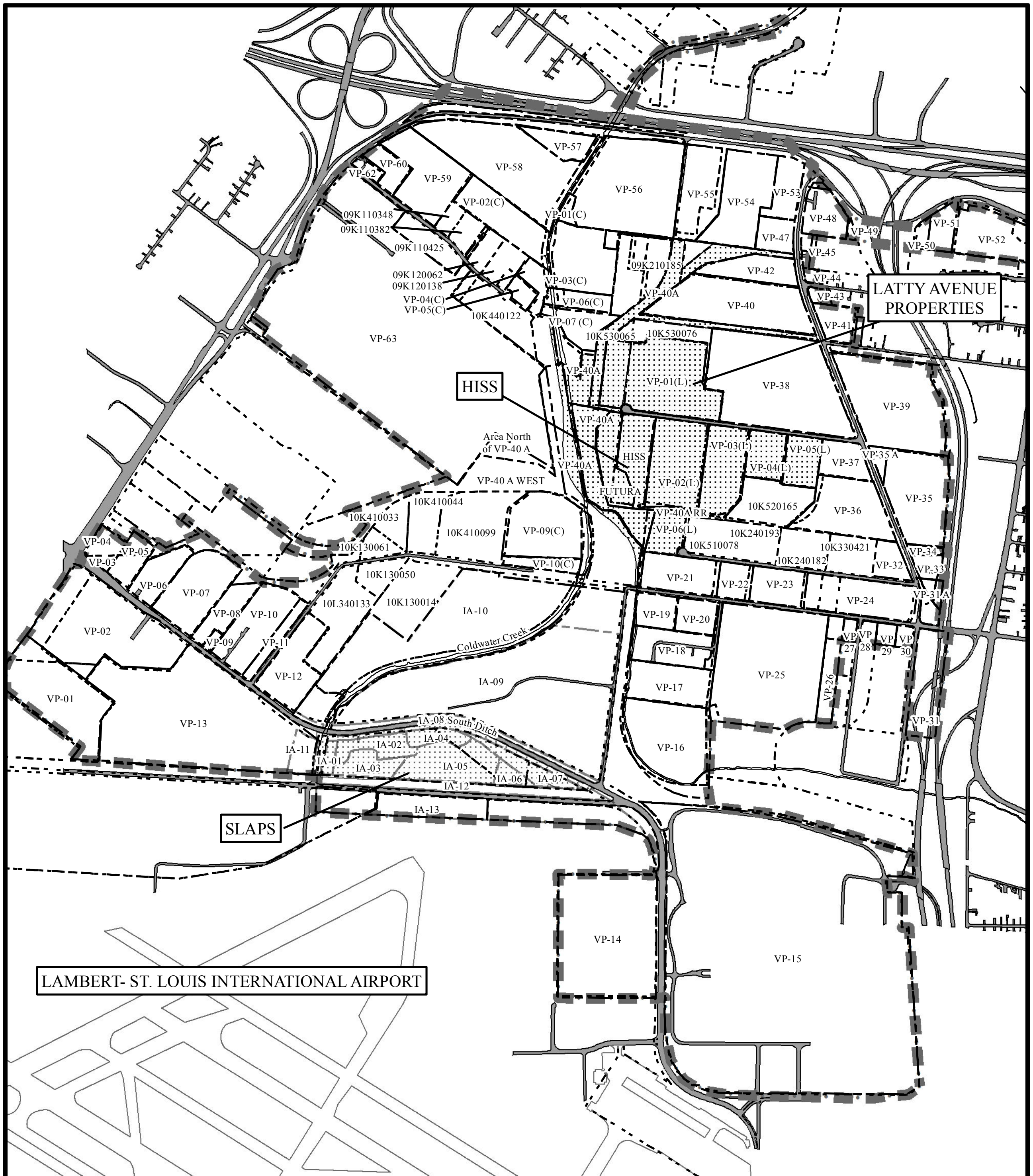
Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 1-1 Location Map of the St Louis Sites.mxd

Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 1-2 Plan View of the SLAPS and SLAPS VPs.mxd



LEGEND:

- Road
- Parcel Boundary
- ROD Boundary
- Airfield
- General Location of SLAPS and Latty Avenue Properties
- Investigation Areas
- River/Stream

N
W E
S

MO-East State Plane
(NAD 83, Feet)

Figure 1-2.
Plan View of the
SLAPS, SLAPS VPs,
and Latty Avenue Properties

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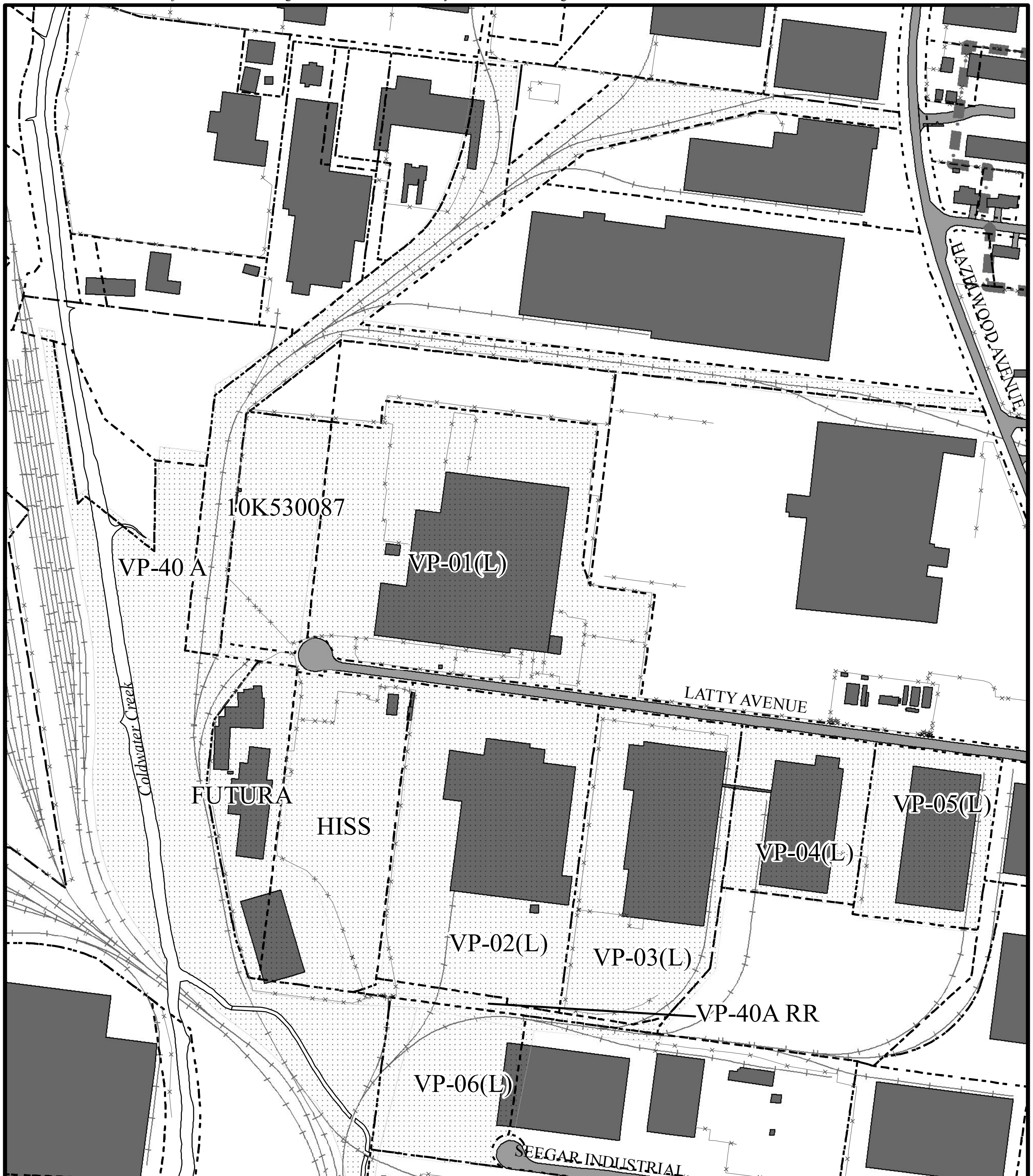

LEGEND:

- Parcel Boundary
- Latty Avenue Properties
- ROD Boundary
- Buildings
- Road
- Fence
- Railroad
- River/Stream

N E S W

MO-East State Plane
(NAD 83, Feet)

0 270 540 Feet

Figure 1-3. Plan View of the Latty Avenue Properties including HISS and Futura

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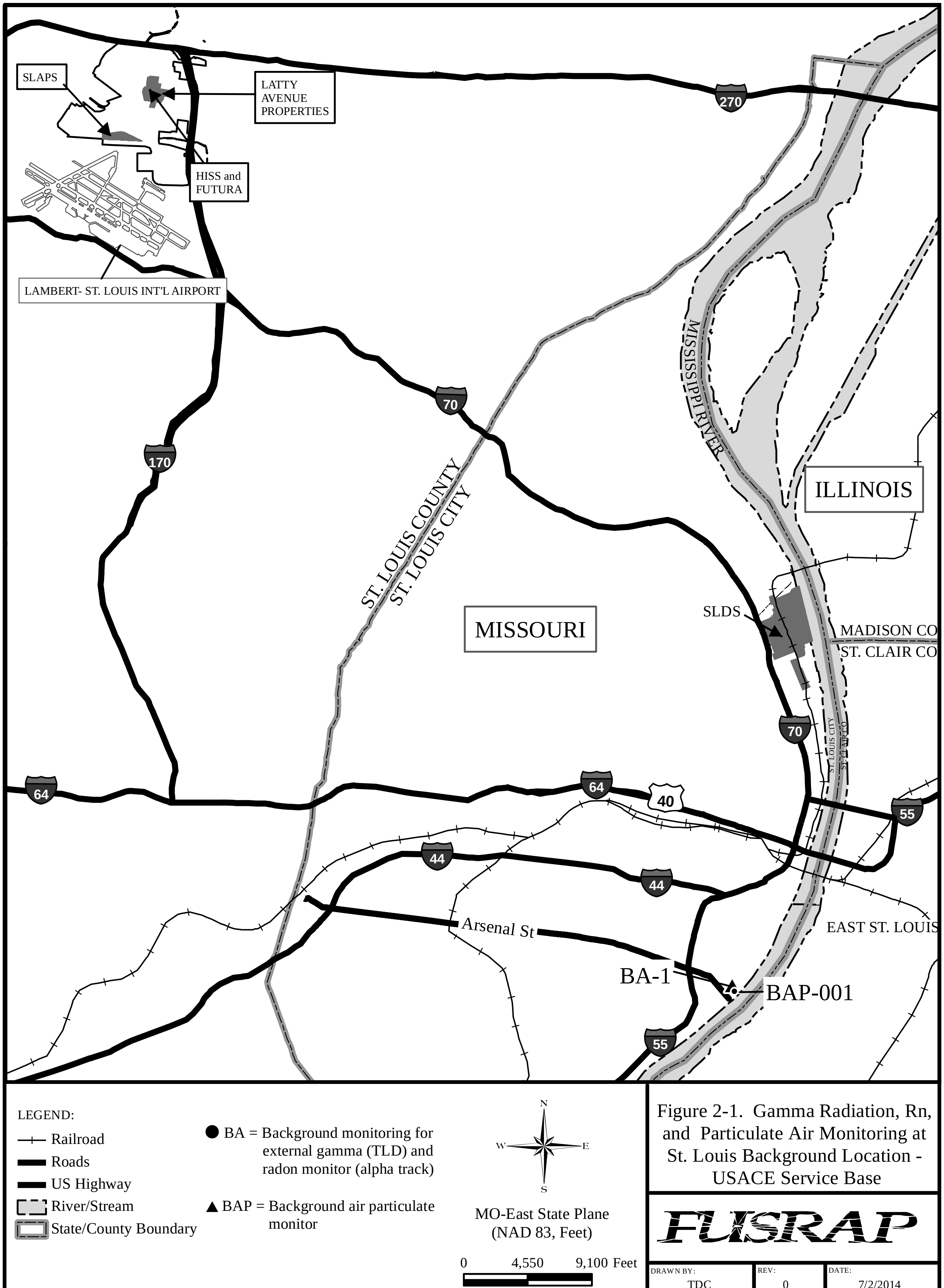

Figure 2-1. Gamma Radiation, Rn, and Particulate Air Monitoring at St. Louis Background Location - USACE Service Base

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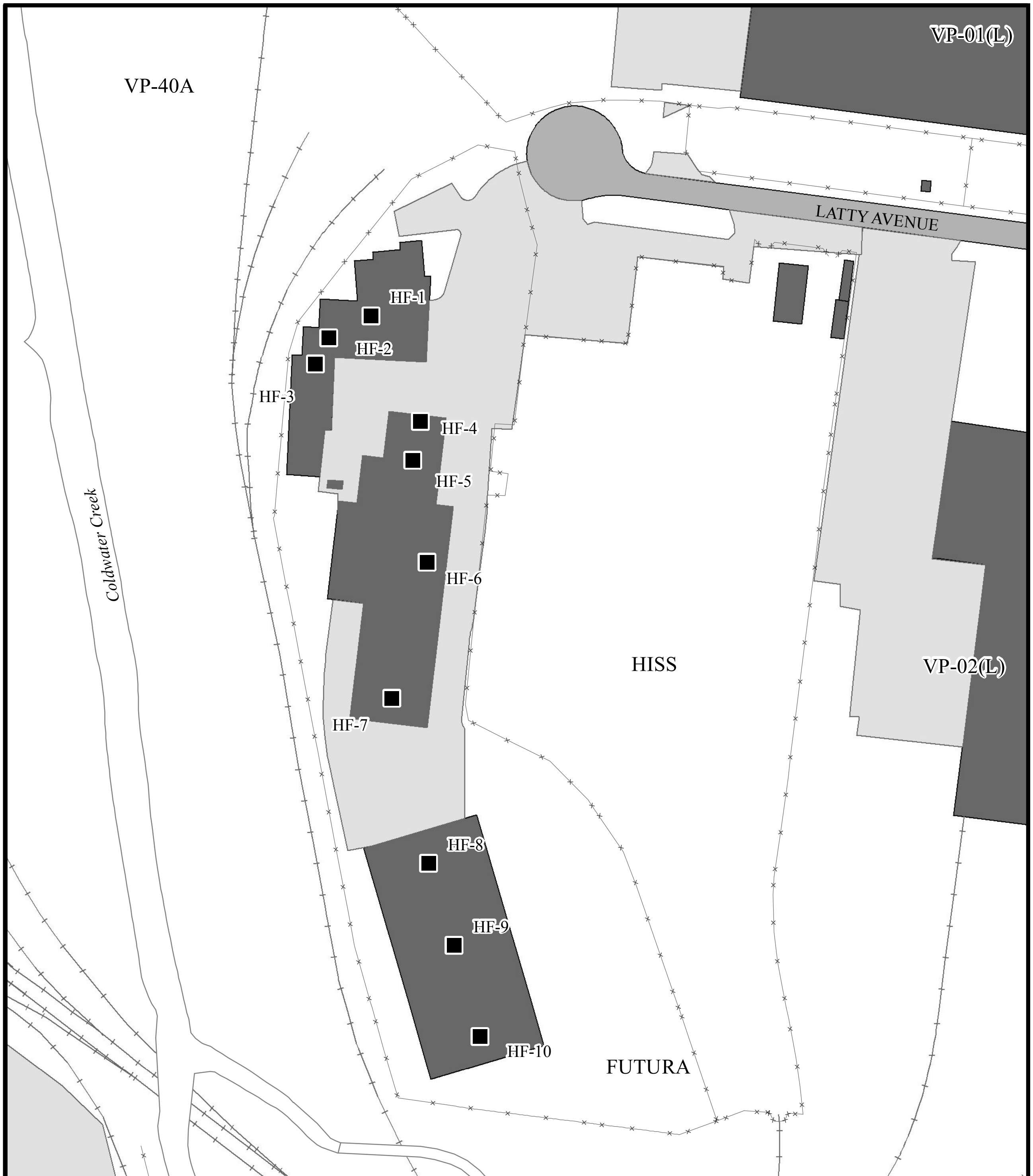
Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 2-2 Gamma Radiation, Rn, and Particulate Air Monitoring Locations at the Latty Avenue Properties.mxd



LEGEND:

- Buildings
- Parking Lots
- Road
- River/Stream
- Fence
- Railroad

■ HF= Futura Indoor Air Monitoring for Radon Monitor (ATD)

N
W E
S

MO-East State Plane
(NAD 83, Feet)

0 80 160 Feet

Figure 2-2. Radon Monitoring Locations at the Latty Avenue Properties

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Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 2-3 Gamma Radiation, Rn, and Particulate Air Monitoring Locations at the SLAPS and SLAPS VPs.mxd

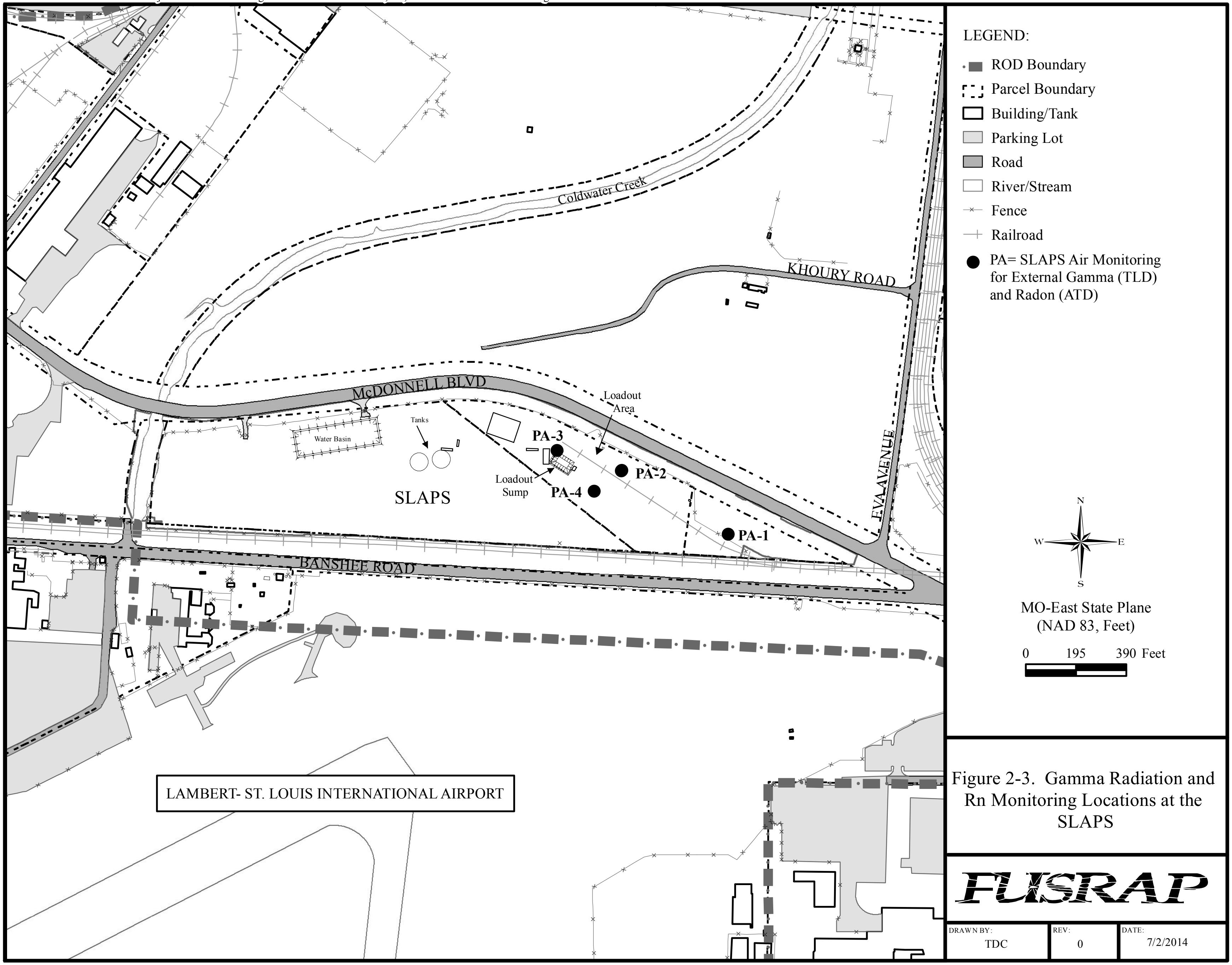

Figure 2-3. Gamma Radiation and Rn Monitoring Locations at the SLAPS

FUSRAP

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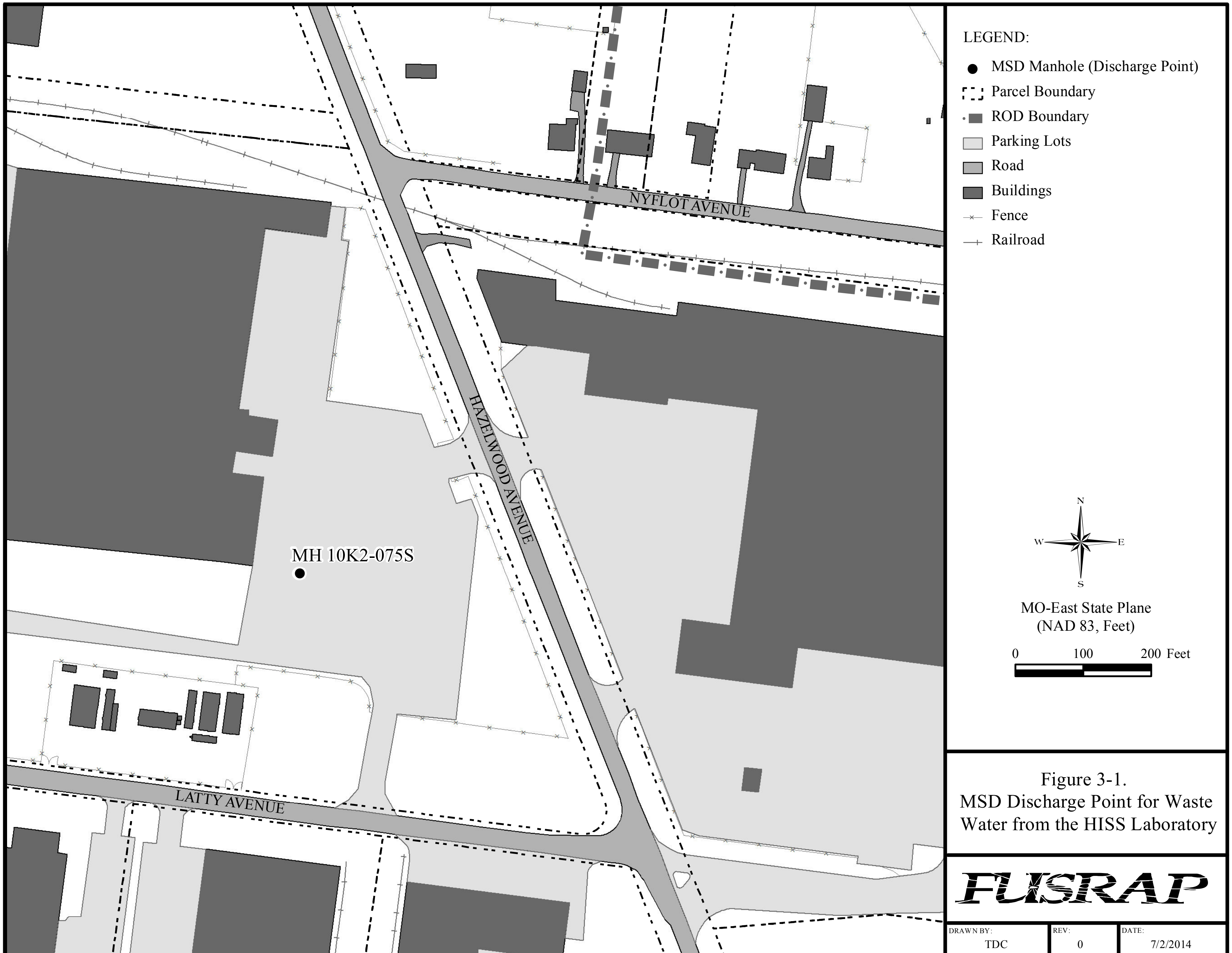

Figure 3-1.
MSD Discharge Point for Waste Water from the HISS Laboratory

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Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 3-2 Storm-Water Outfalls and MSD Excavation-Water Discharge Point at SLAPS.mxd

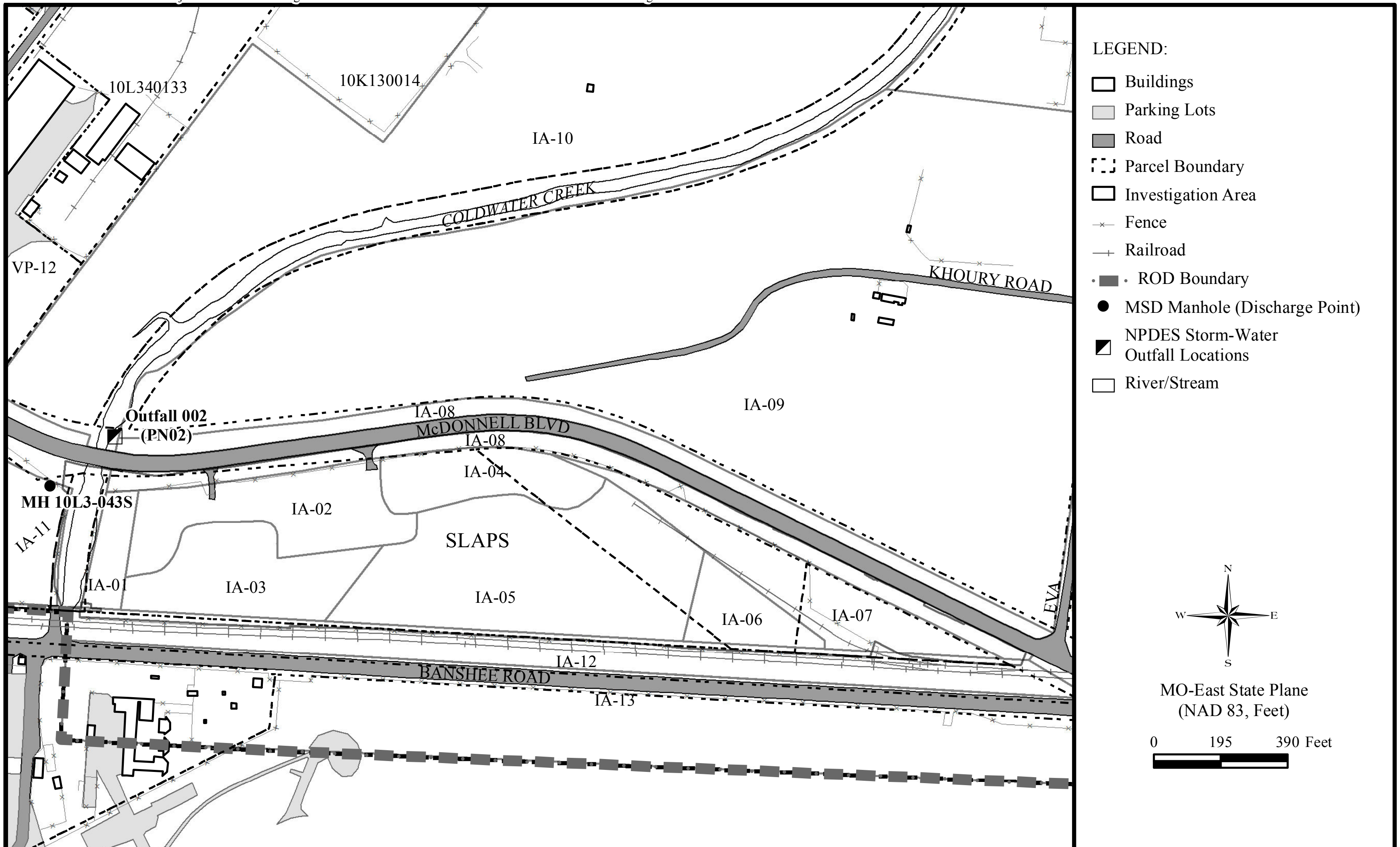

Figure 3-2. Storm-Water Outfall and MSD Excavation-Water Discharge Manhole Locations at the SLAPS

FUSRAP

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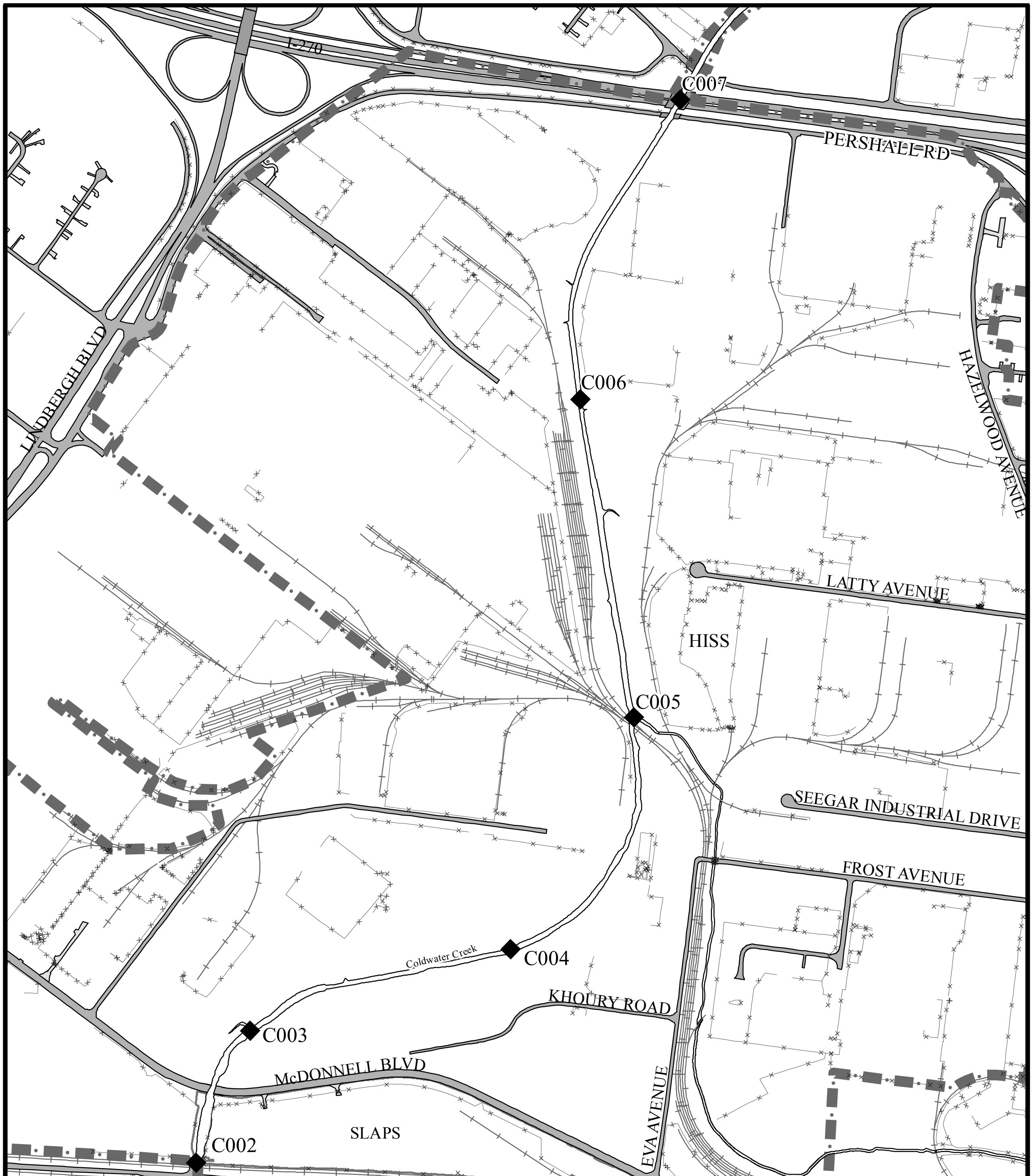

LEGEND:

- ◆ Surface-Water and Sediment Sampling Location
- River/Stream
- Road
- Fence
- Railroad
- ROD Boundary

N W E S

MO-East State Plane
(NAD 83, Feet)

0 410 820 Feet

Figure 3-3. Surface-Water and Sediment Sampling Locations at Coldwater Creek

FUSRAP

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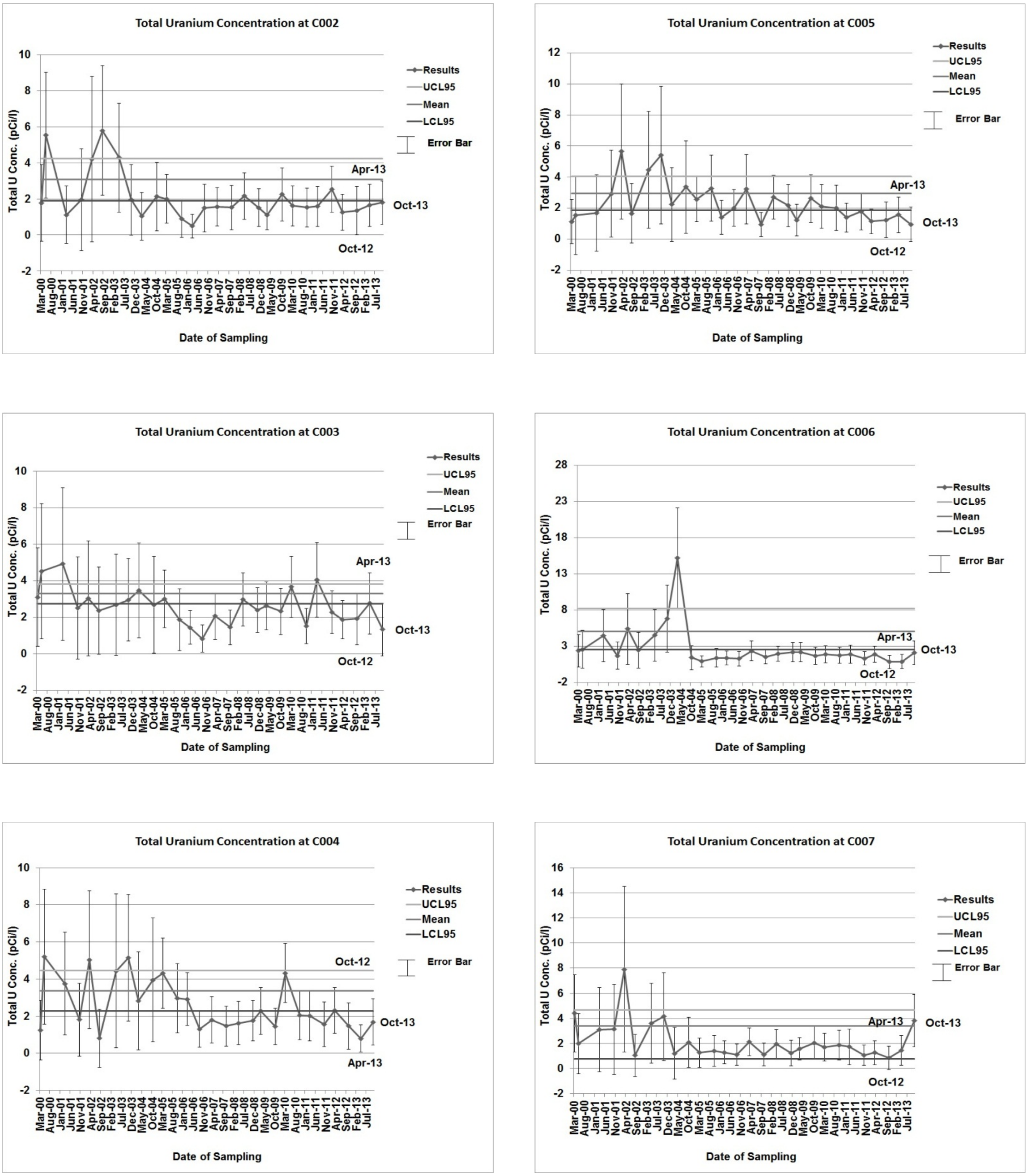
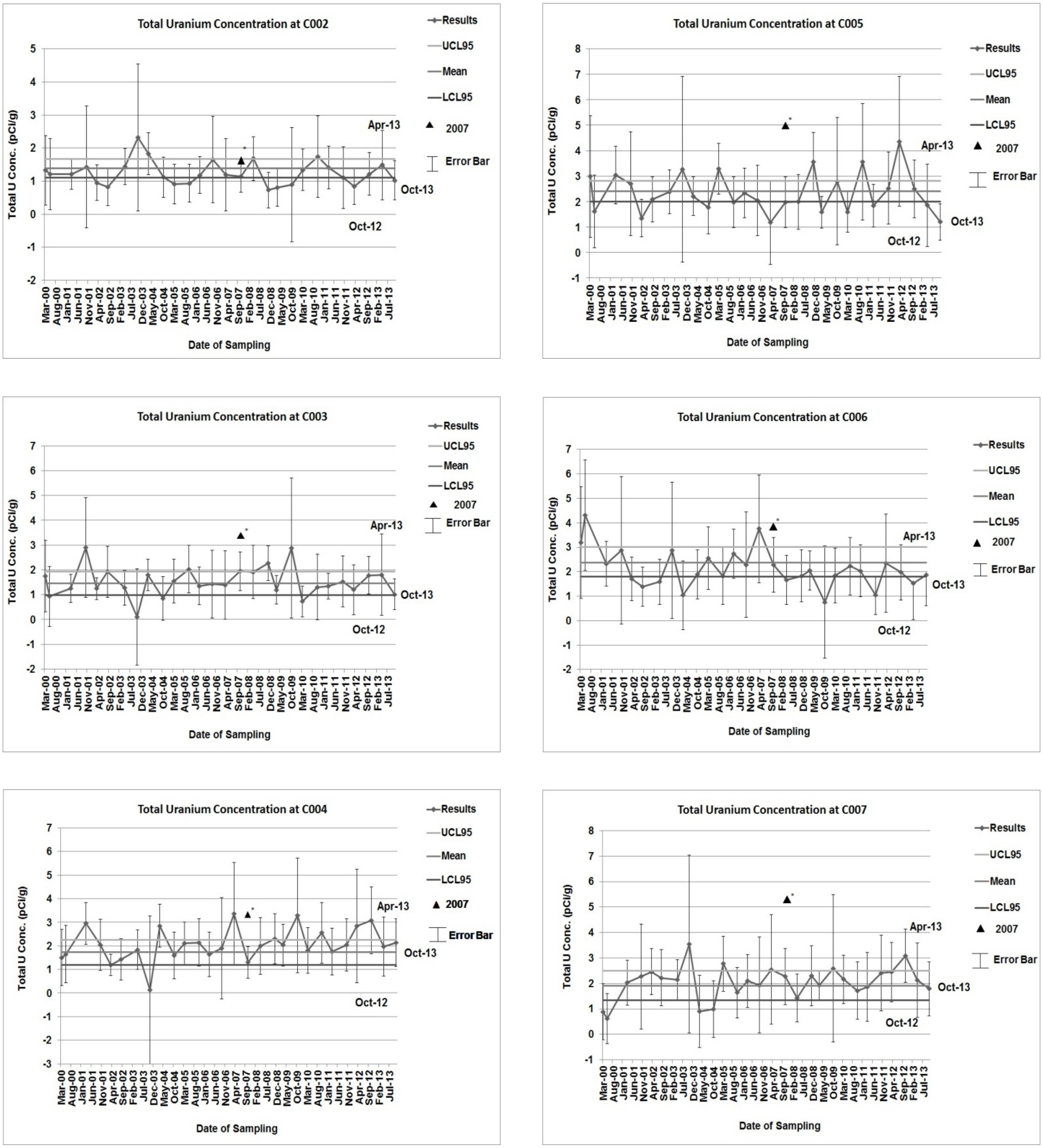


Figure 3-4. Total U Concentrations in Surface Water Versus Sampling Date



* The October 2007 value was incorrectly graphed due to the alpha and gamma results being added together, artificially increasing the value. The charts in this figure have been corrected.

Figure 3-5. Total U Concentrations in Sediment Versus Sampling Date

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.

FUSRAP

Figure 4-1. Generalized Stratigraphic Column for the NC Sites

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Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 4-2 Existing Monitoring Well Locations at the Latty Avenue Properties.mxd

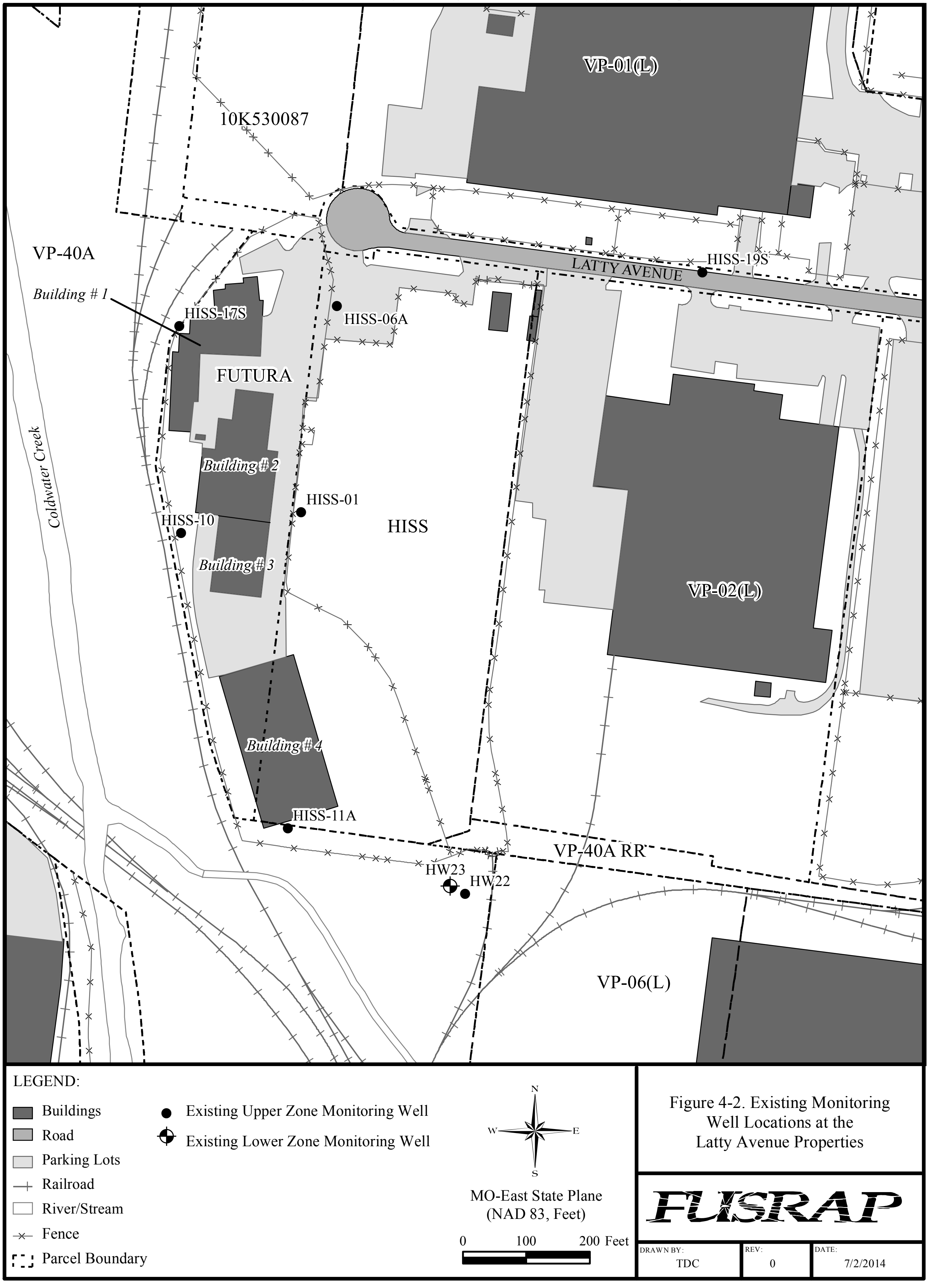

Figure 4-2. Existing Monitoring Well Locations at the Latty Avenue Properties

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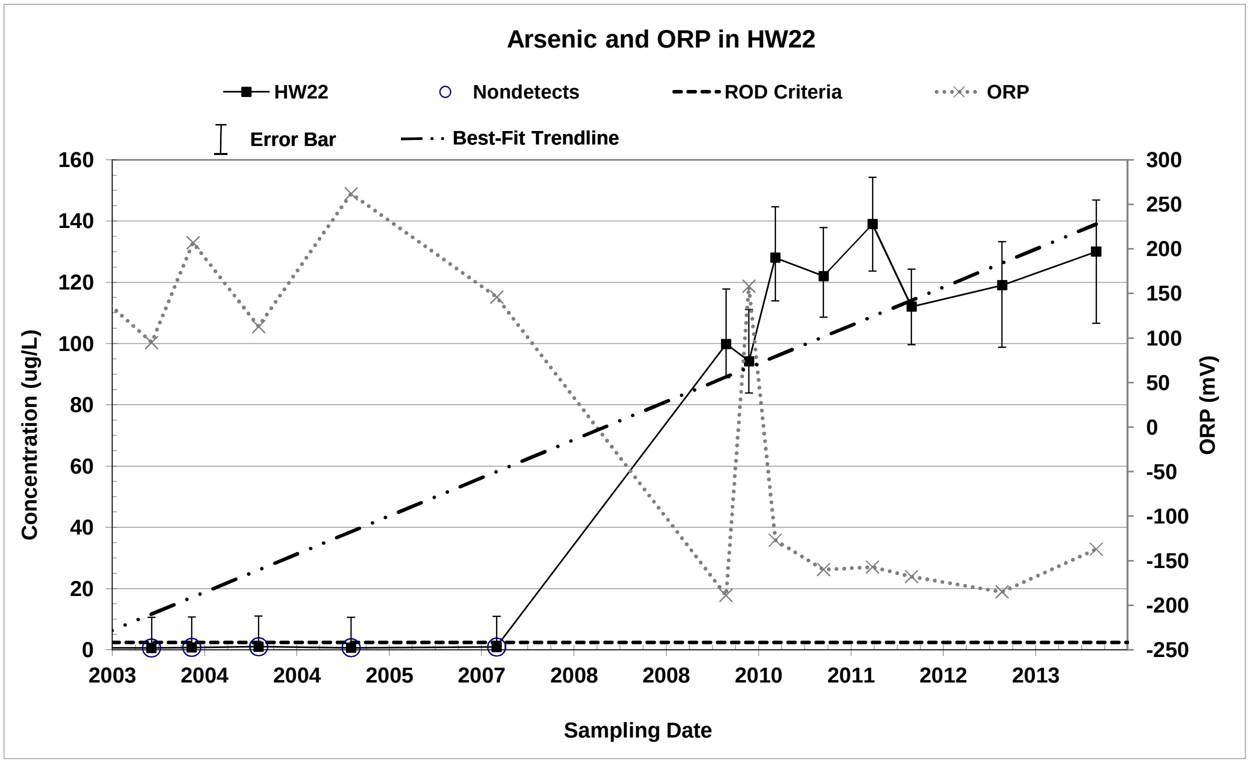
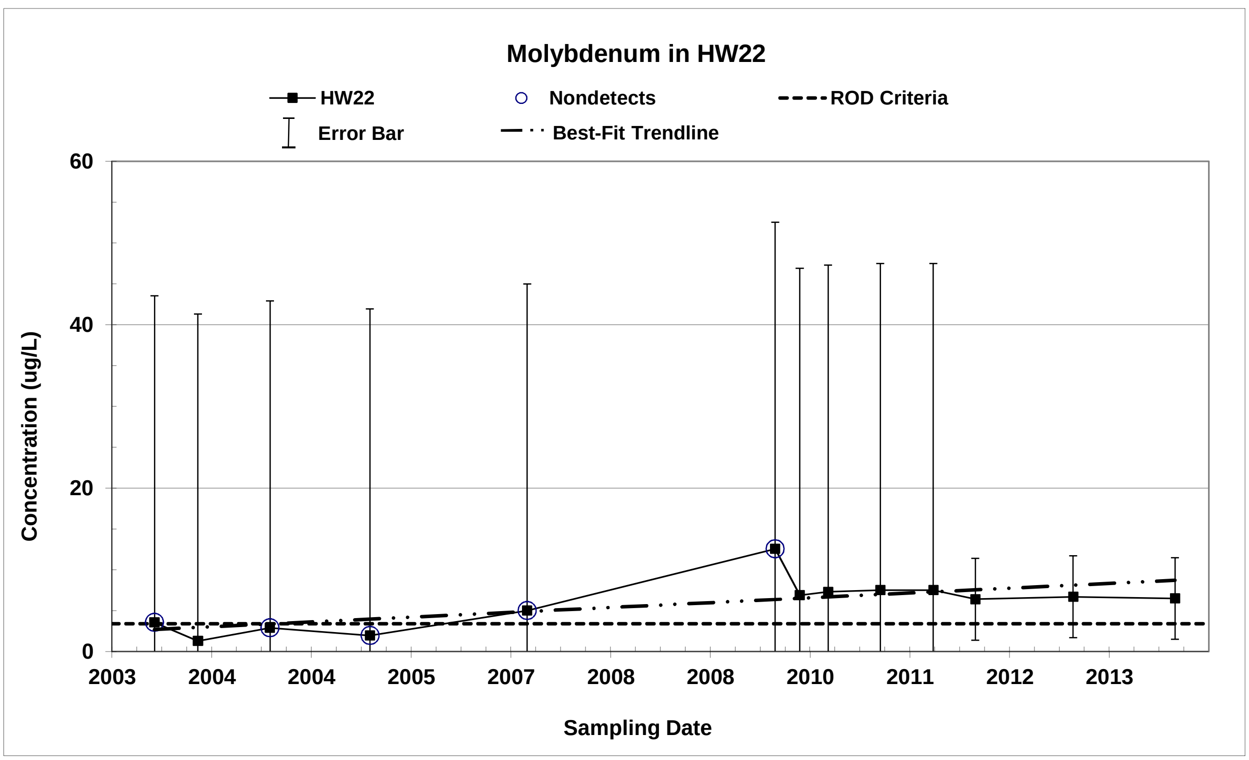




Notes:

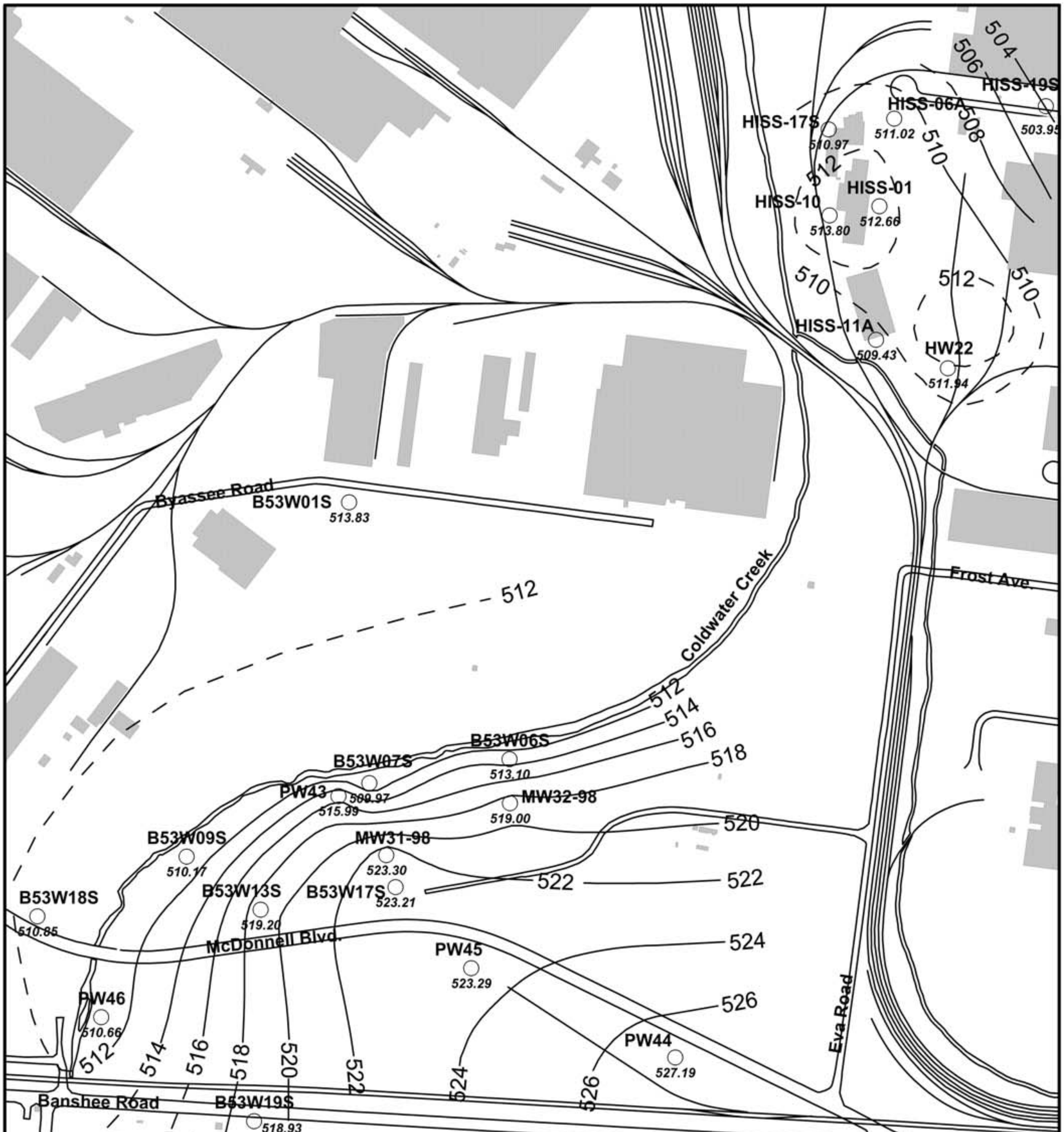
For results less than 3 times the reporting limit (RL), the error bar represents ± RL. For results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.

For results reported as nondetect, the value plotted is half the DL.

Figure 4-3. Time-Versus-Concentration Graph for Arsenic and Molybdenum in Ground Water at HW22

Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 4-4 Selenium Concentrations in Unfiltered HZ-A Ground Water at the Latty Avenue Properties.mxd

Figure 4-4. Total U Concentrations in Unfiltered Ground Water at the Latty Avenue Properties



Legend:

HZ-A Ground-Water Elevation Contours

○ HZ-A Monitoring Well Locations

Ground-water elevations in feet AMSL; contours dashed where inferred
Contour Interval = 2 ft.

Scale: 1 inch = 600 feet

0 300 600 900 1200

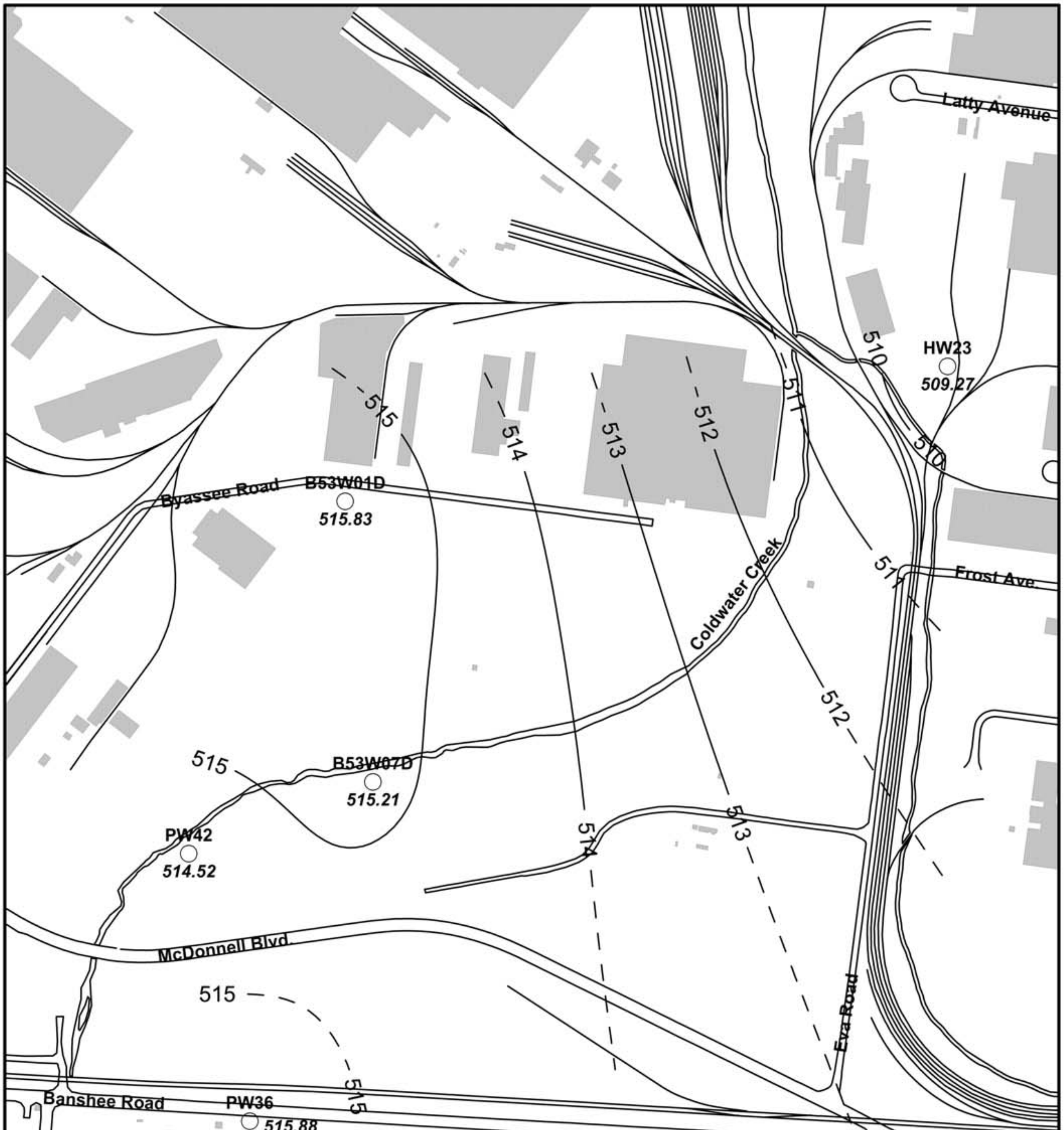
N

MO - East State Plane Coordinate System (NAD83, Feet)

FUSRAP

Figure 4-5. HZ-A Potentiometric Surface at the Latty Avenue Properties and the SLAPS and SLAPS VPs (May 17, 2013)

DRAWN BY: CMW	REV. - DATE: 0 - 10/16/2013



Legend:

HZ-C Ground-Water Elevation Contours

HZ-C Monitoring Well Locations

Ground-water elevations in feet AMSL; contours dashed where inferred
Contour Interval = 1 ft.

Scale: 1 inch = 600 feet

0 300 600 900 1200

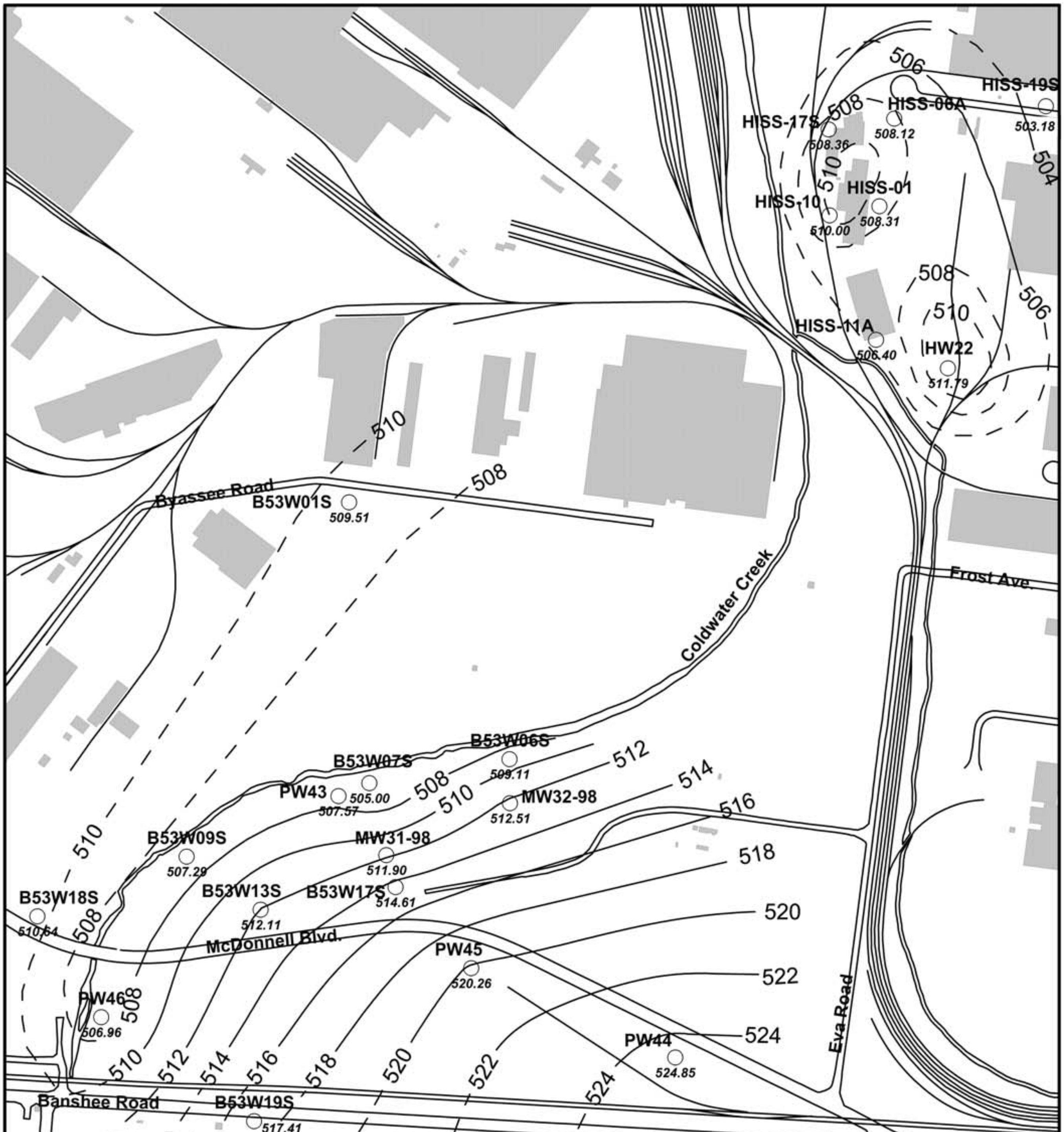
N

MO - East State Plane Coordinate System (NAD83, Feet)

FUSRAP

Figure 4-6. HZ-C Potentiometric Surface at the Latty Avenue Properties and the SLAPS and SLAPS VPs (May 17, 2013)

DRAWN BY:	REV. - DATE:
CMW	0 - 10/16/13



Legend:

—— HZ-A Ground-Water Elevation Contours

○ HZ-A Monitoring Well Locations

Ground-water elevations in feet AMSL; contours dashed where inferred
Contour Interval = 2 ft.

Scale: 1 inch = 600 feet

0 300 600 900 1200

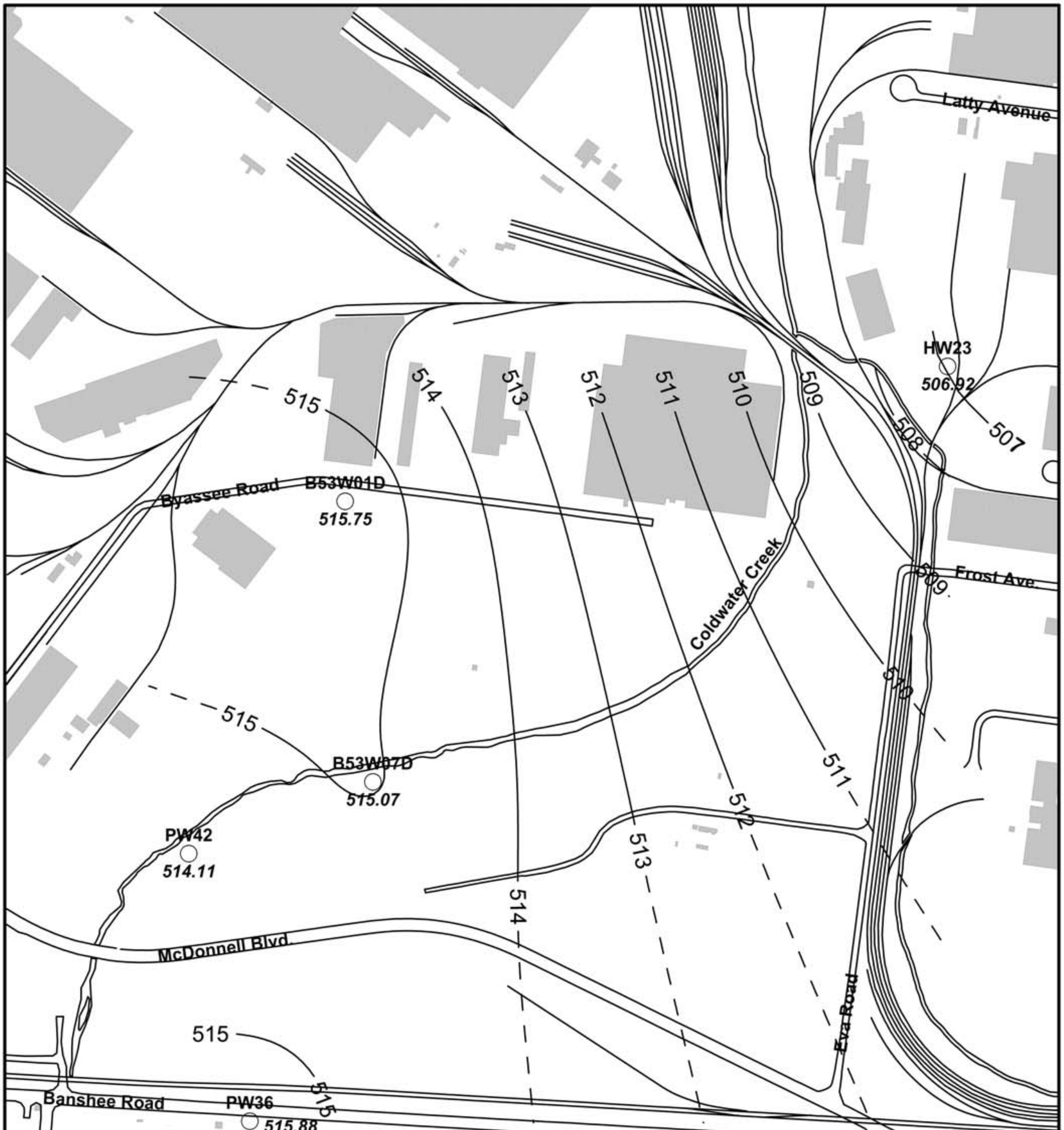
N

MO - East State Plane Coordinate System (NAD83, Feet)

FUSRAP

Figure 4-7. HZ-A Potentiometric Surface at the Latty Avenue Properties and the SLAPS and SLAPS VPs (December 3, 2013)

DRAWN BY: CMW	REV. - DATE: 0 - 12/11/2013



Legend:

HZ-C Ground-Water Elevation Contours

HZ-C Monitoring Well Locations

Ground-water elevations in feet AMSL; contours dashed where inferred
Contour Interval = 1 ft.

Scale: 1 inch = 600 feet

0 300 600 900 1200

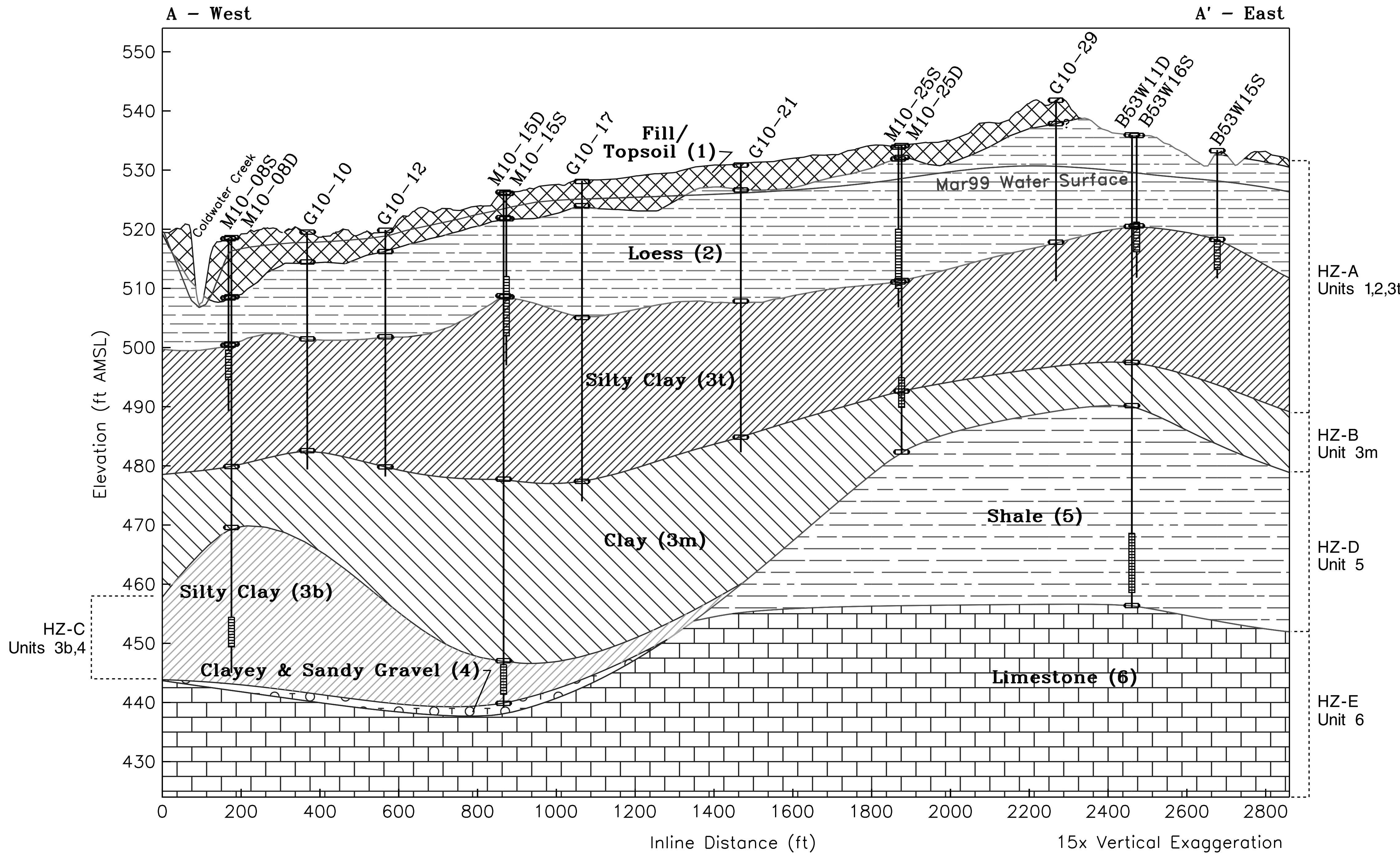
N

MO - East State Plane Coordinate System (NAD83, Feet)

FUSRAP

Figure 4-8. HZ-C Potentiometric Surface at the Latty Avenue Properties and the SLAPS and SLAPS VPs (December 3, 2013)

DRAWN BY:	REV. - DATE:
CMW	0 - 12/11/13



Notes

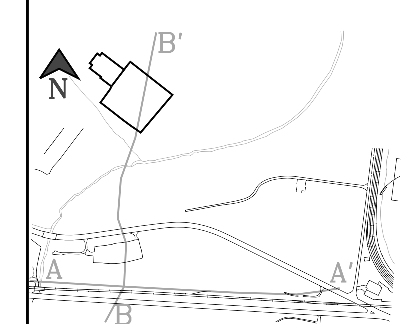
Geologic data used in the cross section collected through 2000.

Legend

Borehole pick

Well screen

Cross Section Location Map



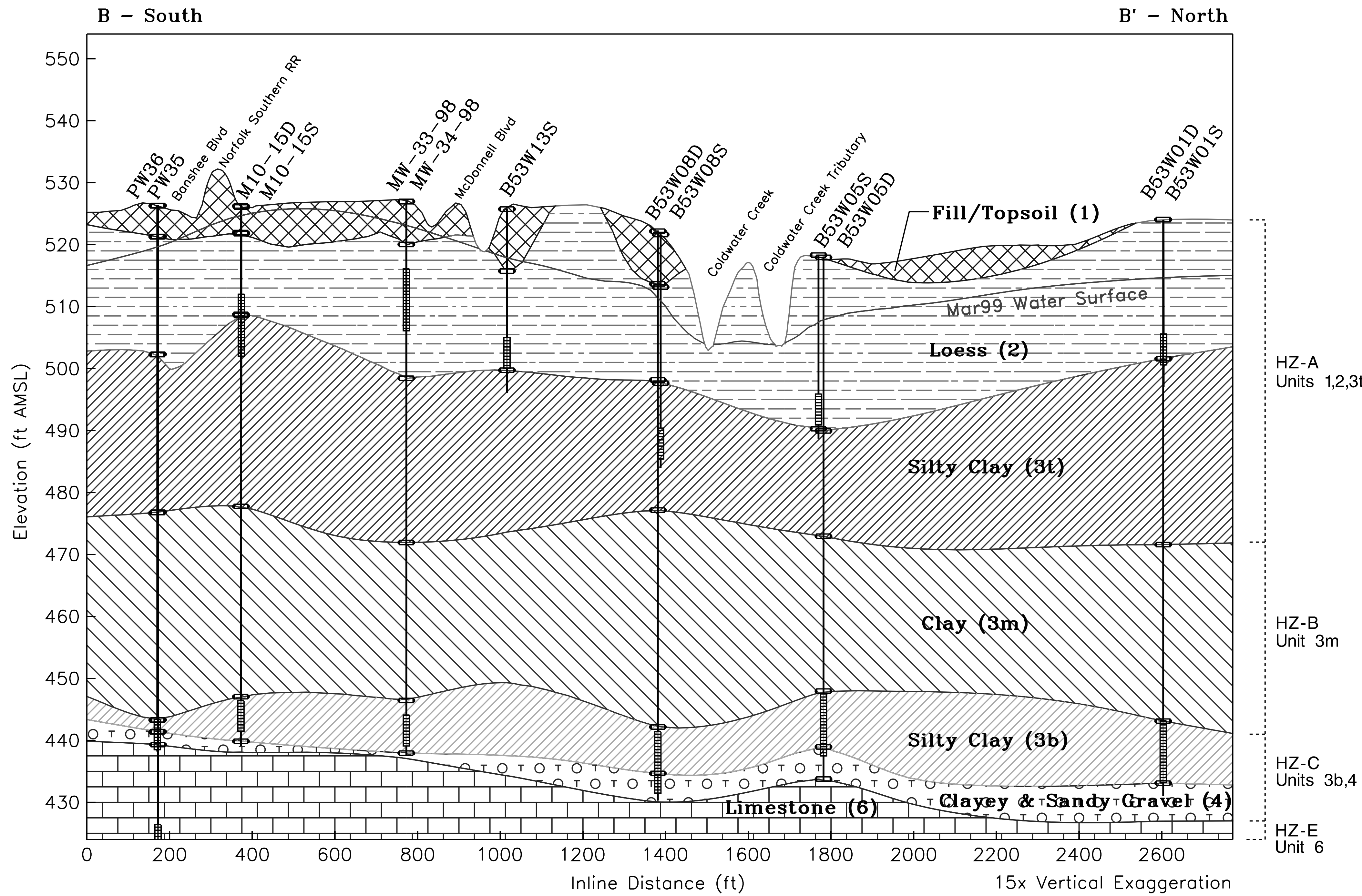
FUSRAP

Figure 4-9. Geologic Cross-Section A-A' at the SLAPS

Drawn By: N. Voorhies

Rev. No. - Date: 0 - 08/29/00

File: SLAPSGlg05ExtendedAAS.sho



Notes

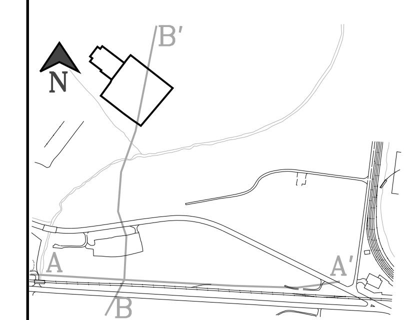
Geologic data used in the cross section collected through 2000.

Legend

Borehole pick

Well screen

Cross Section Location Map



FUSRAP

Figure 4-10. Geologic Cross-Section B-B' at the SLAPS and SLAPS VPs

Drawn By: N. Voorhies

Rev. No.- Date: 0 - 08/29/00

File: SLAPSGlg05ExtendedBBS.sho

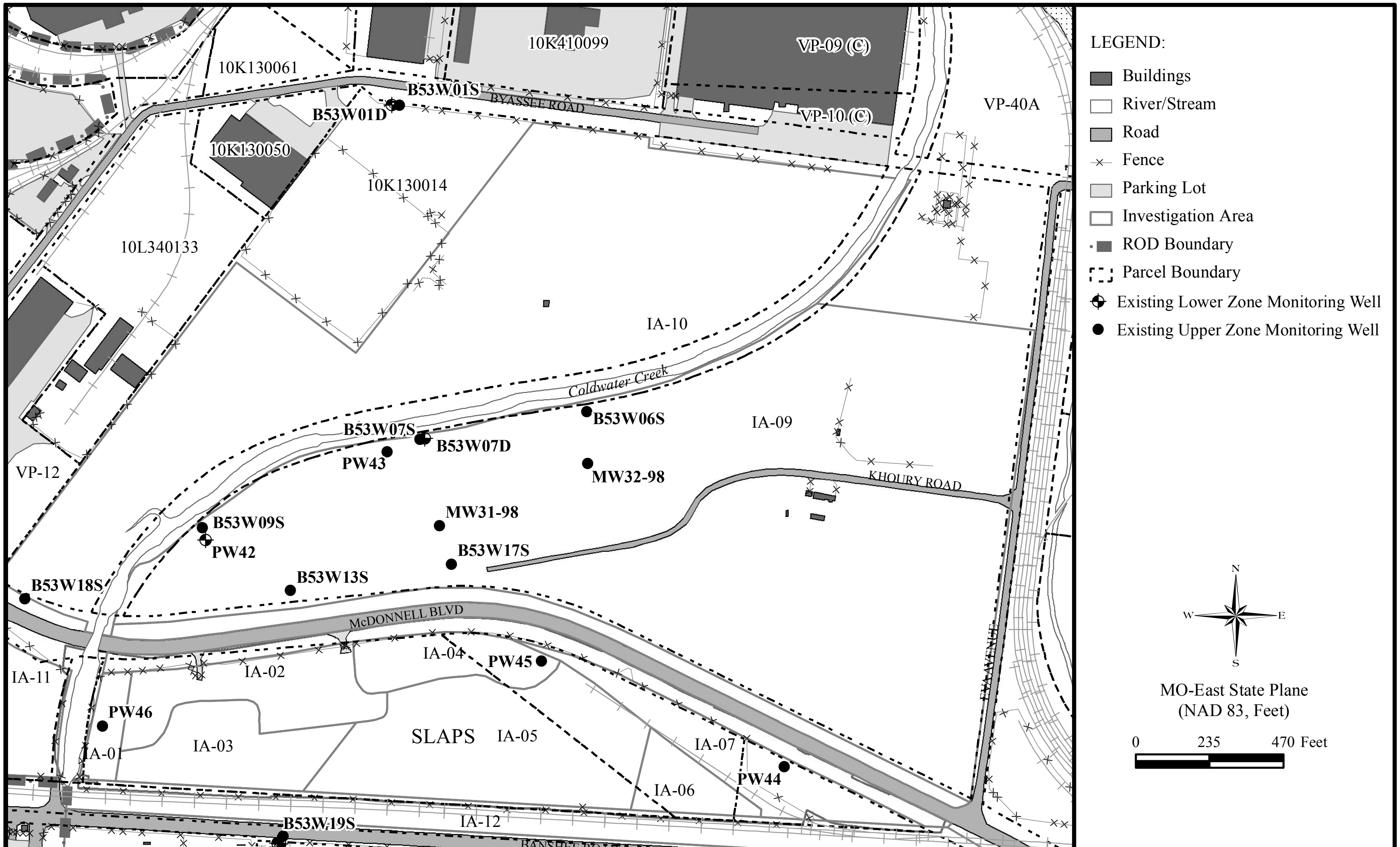
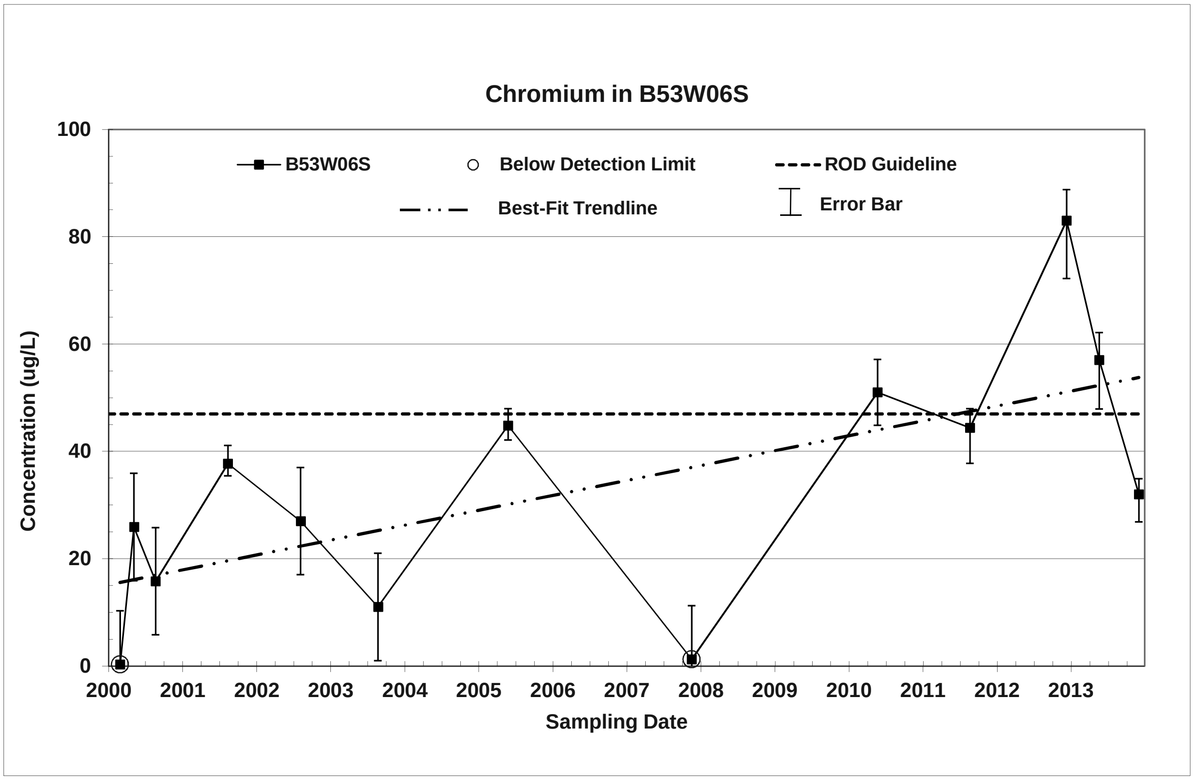


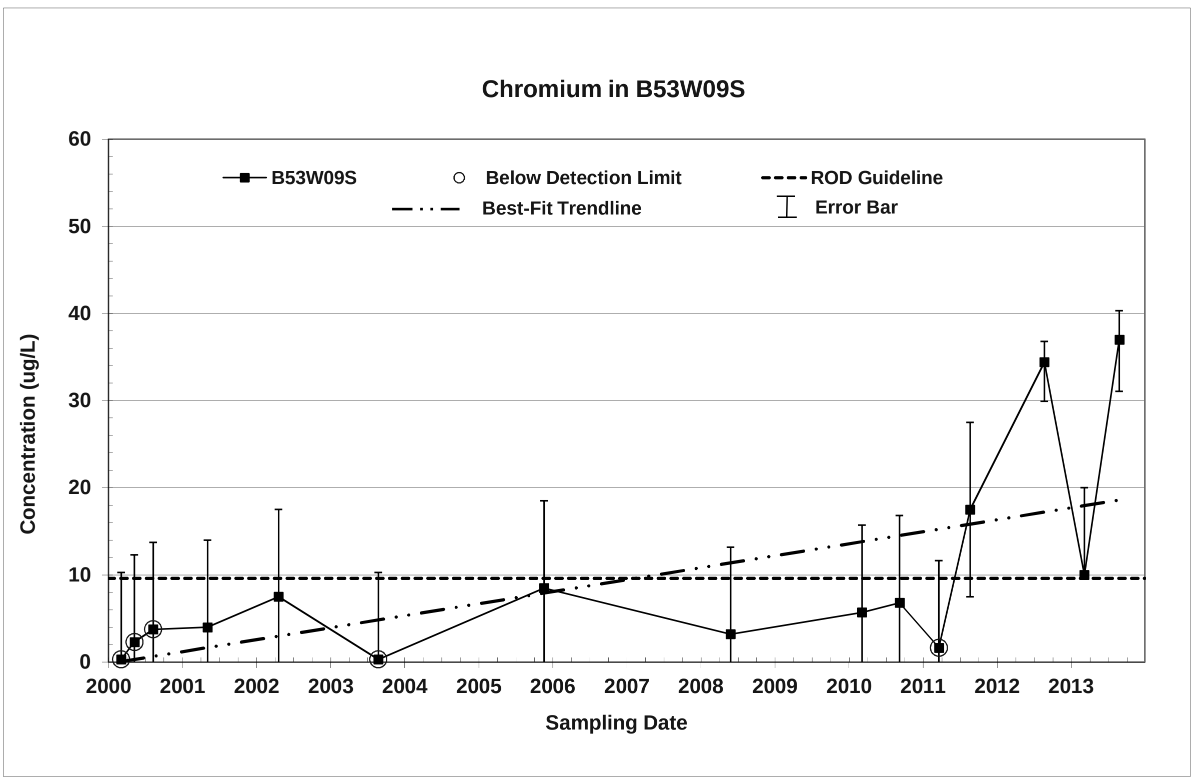
Figure 4-11. Existing Ground-Water Monitoring Locations at the SLAPS and Surrounding SLAPS VPs

FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	7/2/2014

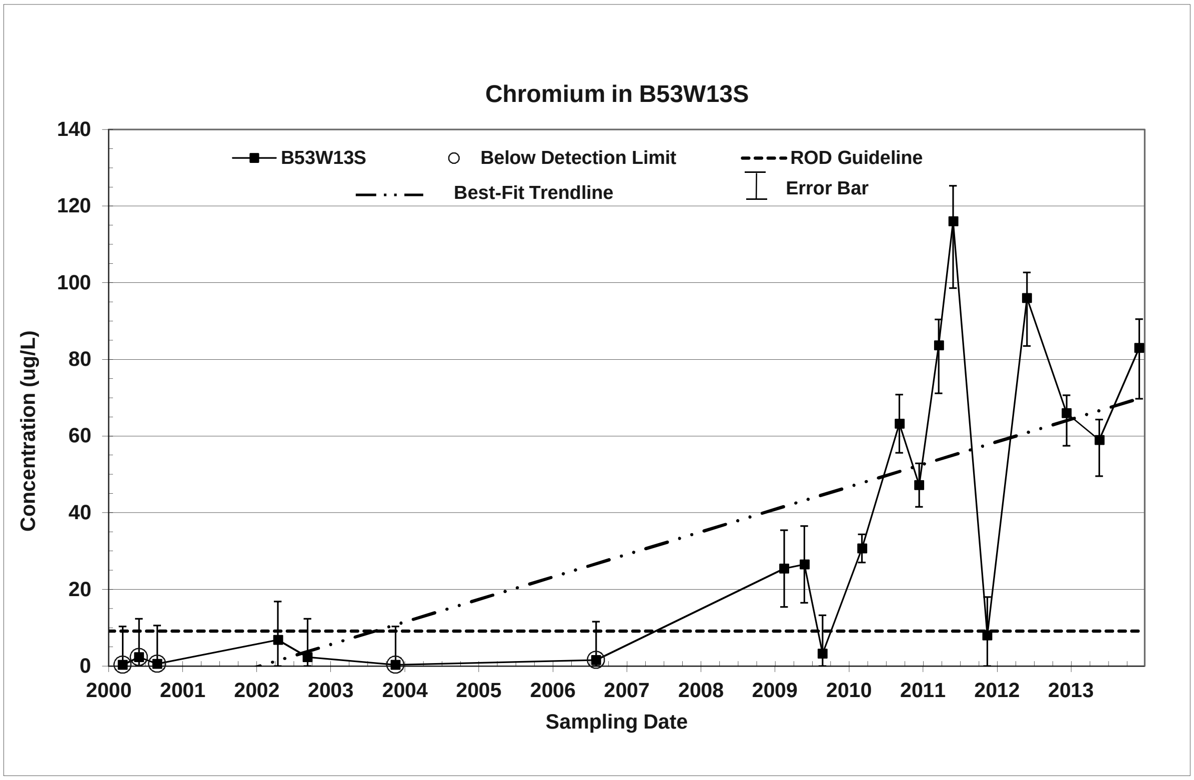
Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 4-11 Ground-Water Monitoring Locations at the SLAPS and Surrounding SLAPS VPs.mxd

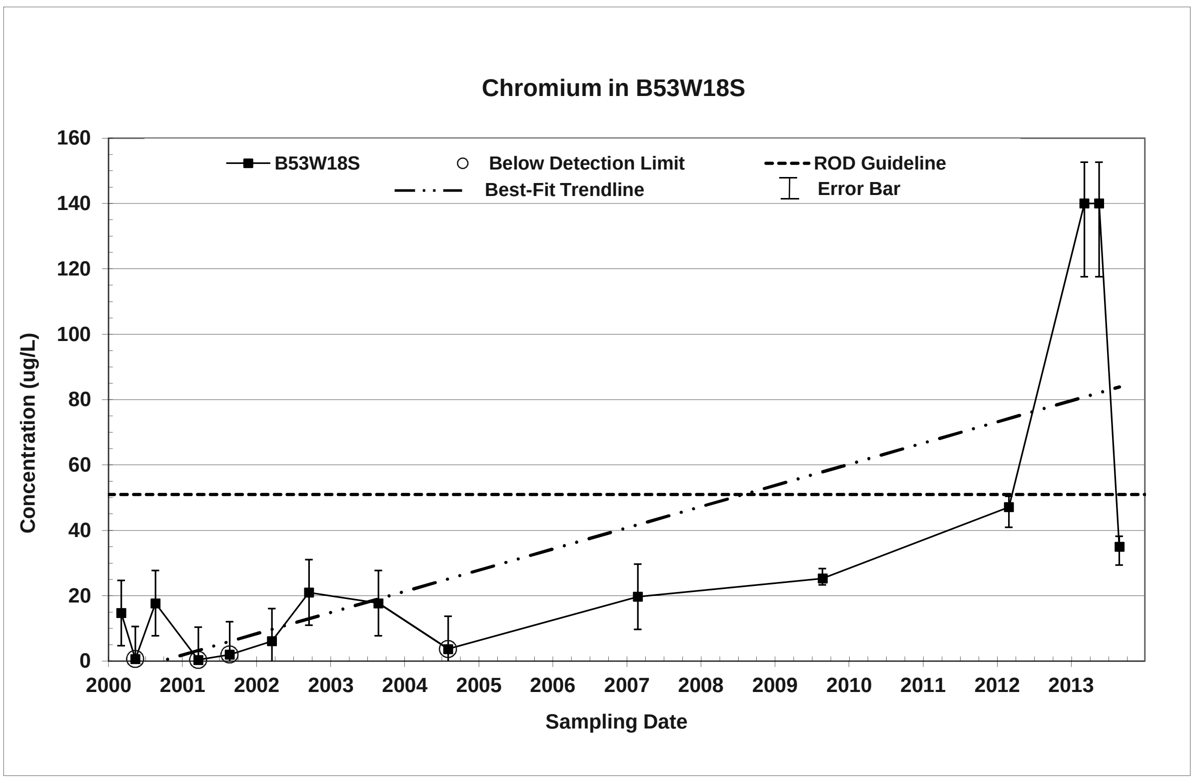




Notes:
For chromium results less than 3 times the RL, the error bar represents ± RL. For results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
For chromium results reported below the DL (nondetect), the value plotted is half the DL.

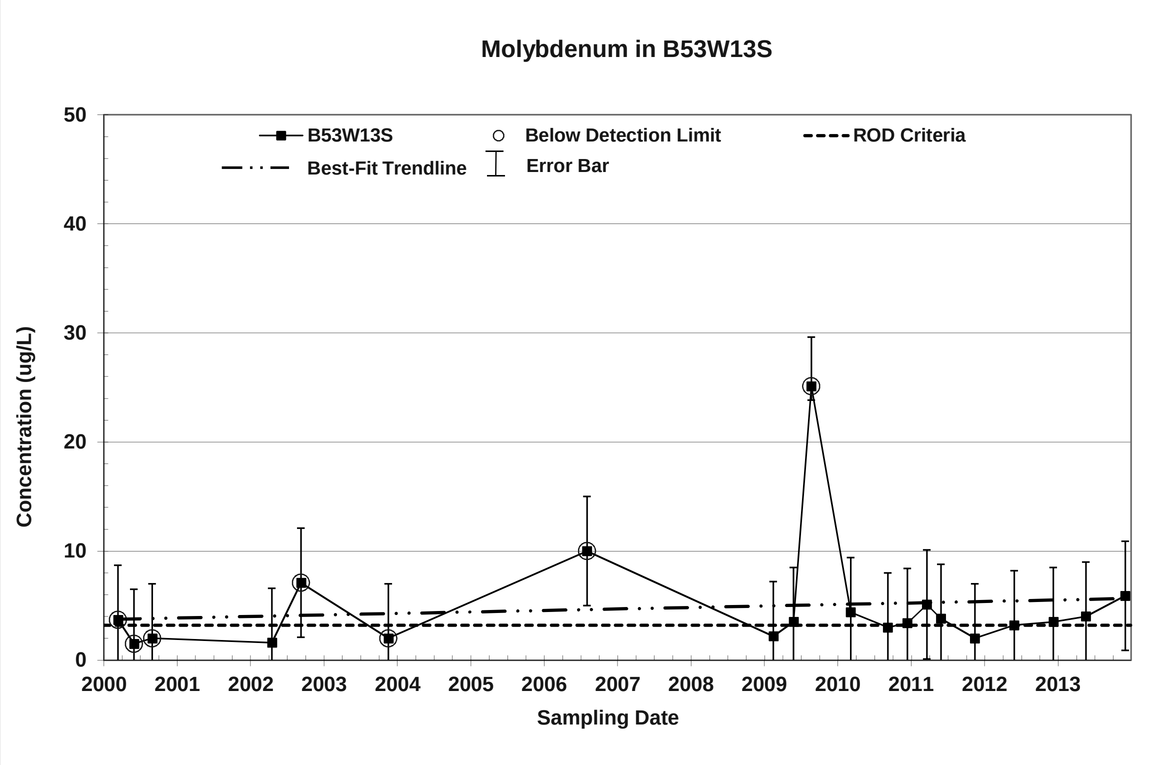
Figure 4-12. Time-Versus-Concentration Graphs for Chromium in Ground Water at B53W06S, B53W09S, B53W13S, and B53W18S

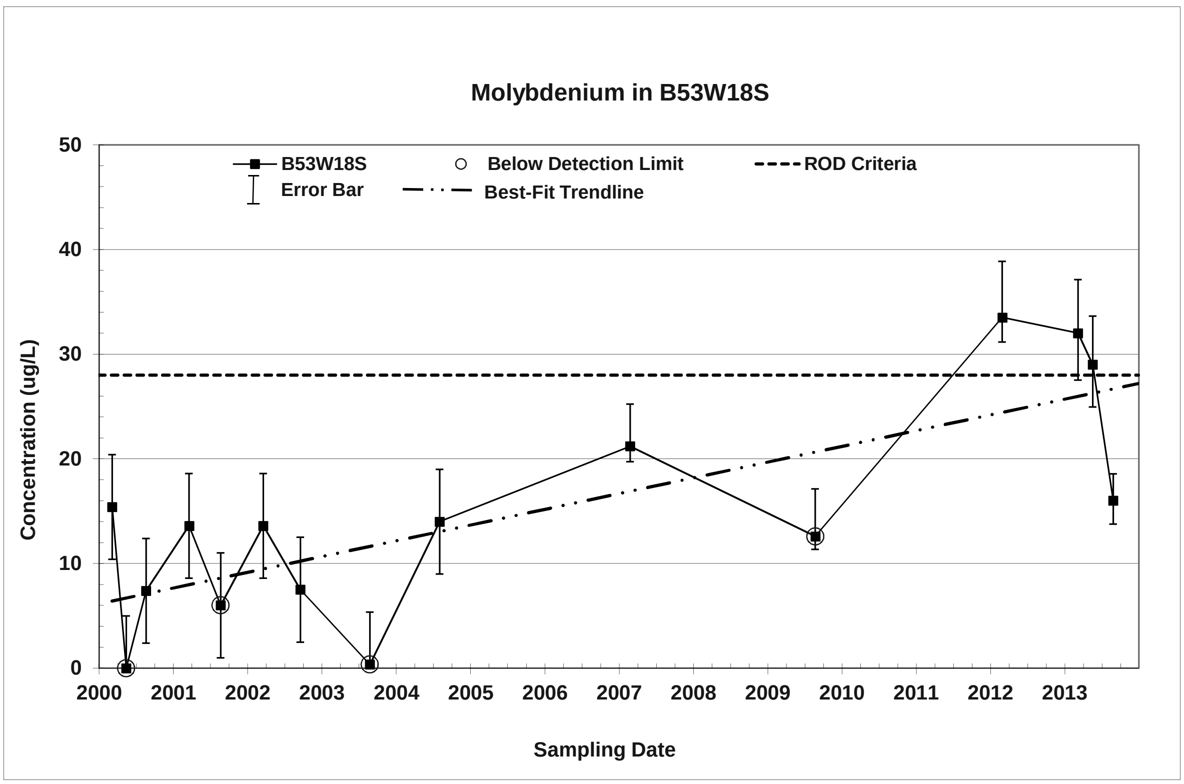




Notes:
For chromium results less than 3 times the RL, the error bar represents ± RL. For results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
For chromium results reported below the DL (nondetect), the value plotted is half the DL.

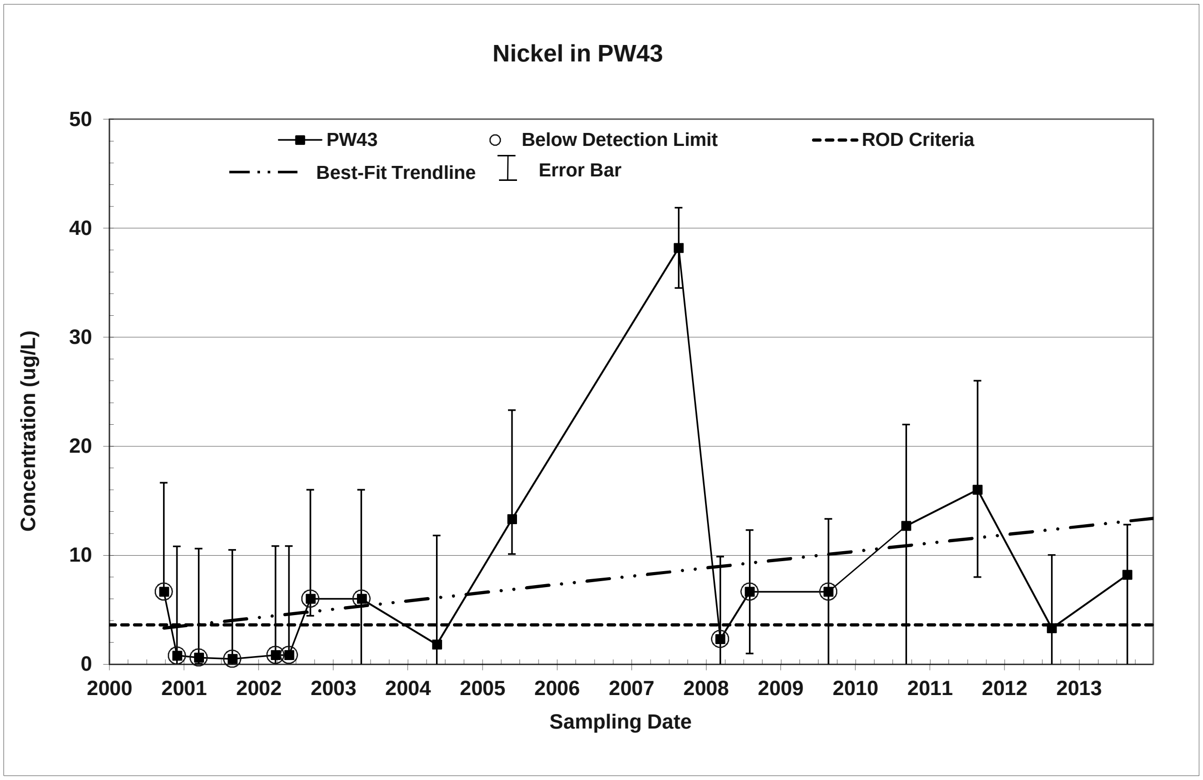
Figure 4-12. Time-Versus-Concentration Graphs for Chromium in Ground Water at B53W06S, B53W09S, B53W13S, and B53W18S (Continued)

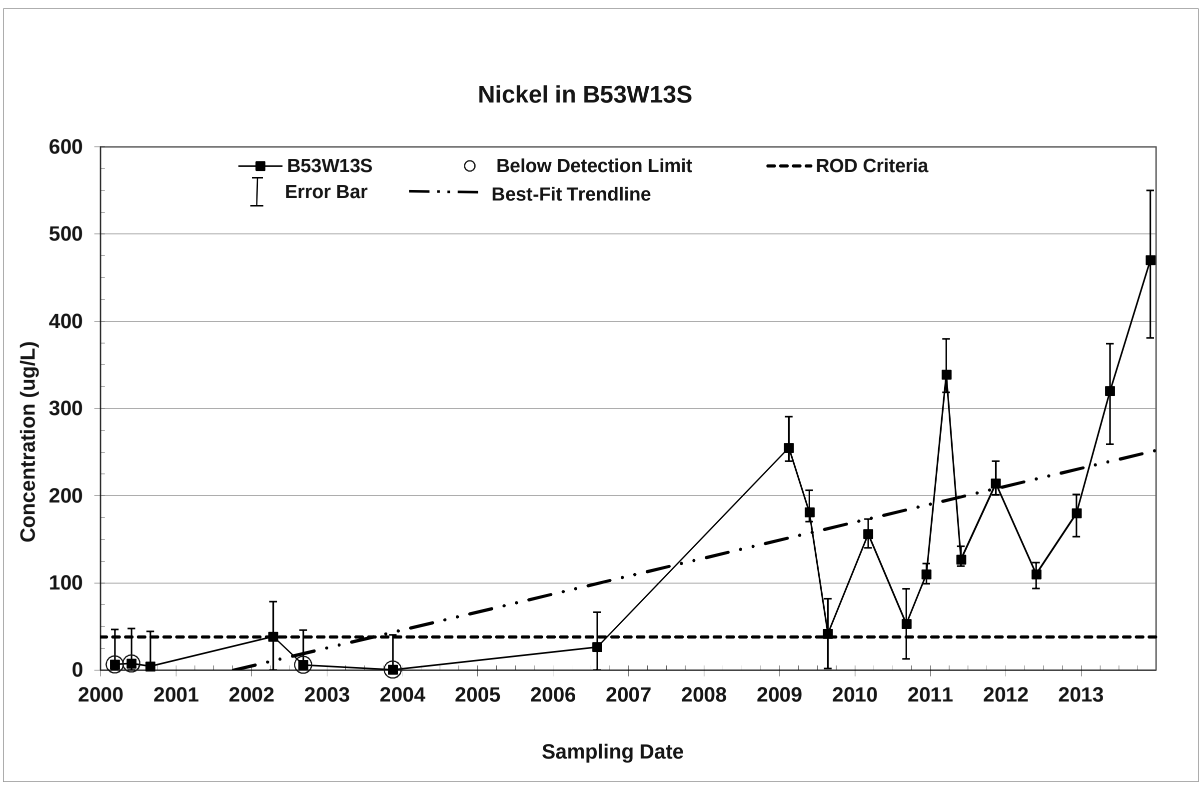




Notes:
For molybdenium results less than 3 times the RL, the error bar represents ± RL. For results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.
For molybdenum results reported below the DL (nondetect), the value plotted is half the DL.

Figure 4-13. Time-Versus-Concentration Graphs for Molybdenum in Ground Water at B53W13S and B53W18S



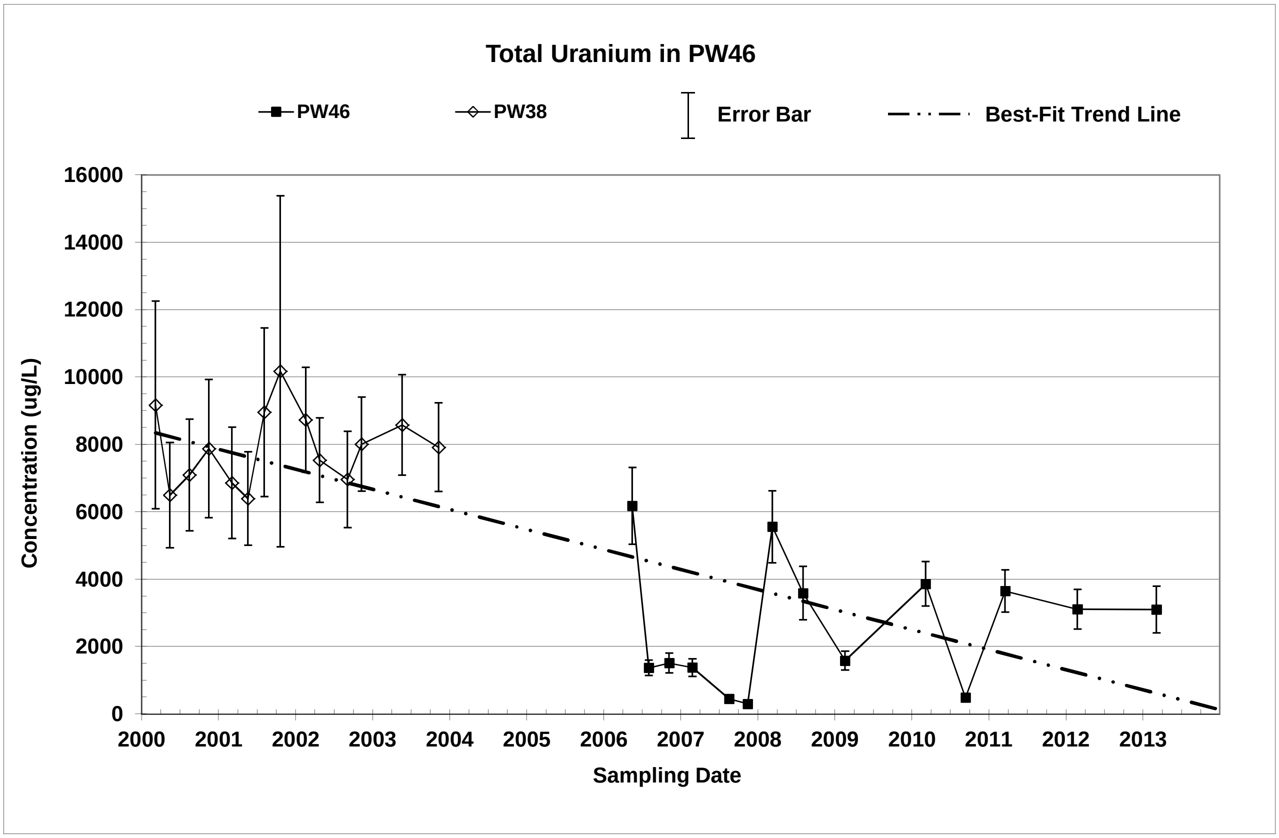


Notes:

For nickel results less than 3 times the RL, the error bar represents ± RL. For results exceeding 3 times the RL, the error bar represents the upper and lower control limits on the control spike samples.

For nickel results reported below the DL (nondetect), the value plotted is half the DL.

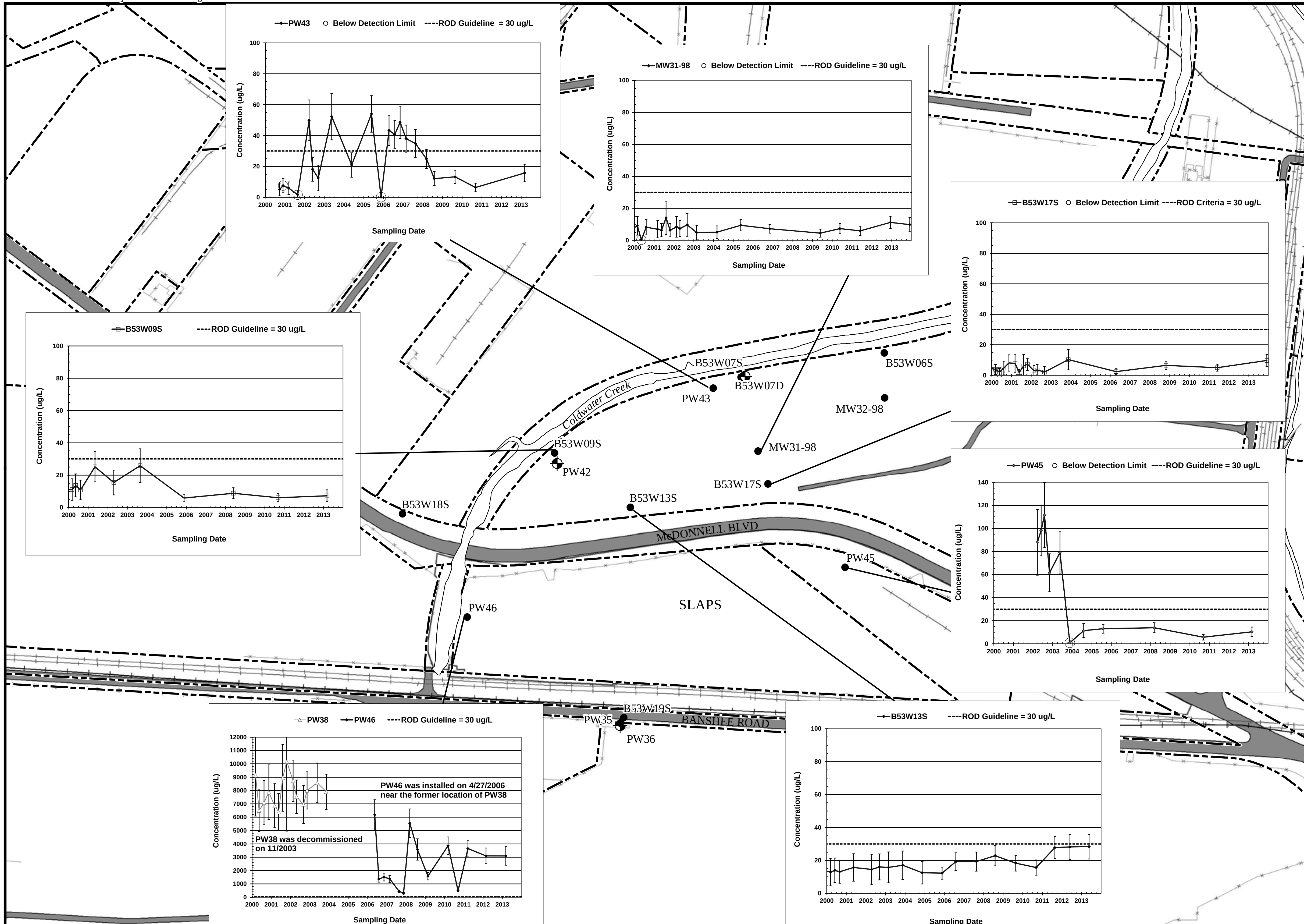
Figure 4-14. Time-Versus-Concentration Graphs for Nickel in Ground Water at PW43 and B53W13S



Notes:
For total U, the error bar represents ± the sum of the measurement errors for U-234, U-235, and U-238, converted to µg/L.

Figure 4-15. Time-Versus-Concentration Graphs for Total U in Ground Water at PW46

Path: U:\GPS\EMDAR\NCO Projects\FY2014\Rev0\Figure 4-16 Selenium Concentrations in Ground Water at the SLAPS and SLAPS VPs.mxd



Legend

- Parcel Boundary
- River/Stream
- Road
- Fence
- Railroad
- Existing HZ-A Monitoring Well
- Existing HZ-C or HZ-E Monitoring Well
- Error Bars

N W E S

MO-East State Plane
(NAD 83, Feet)

0 200 400 Feet

Figure 4-16. Total U Concentrations in Unfiltered Ground Water at the SLAPS and SLAPS VPs

FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	7/2/2014

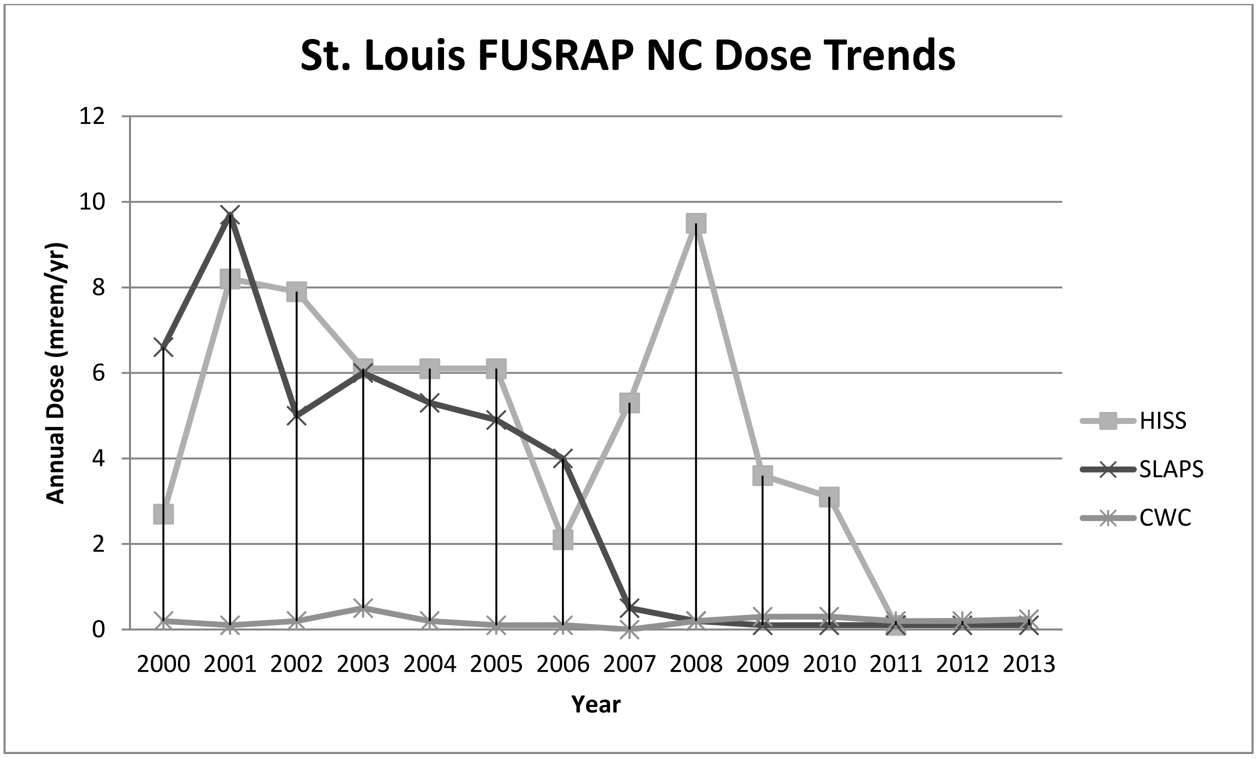


Figure 6-1. St. Louis FUSRAP NC Dose Trends

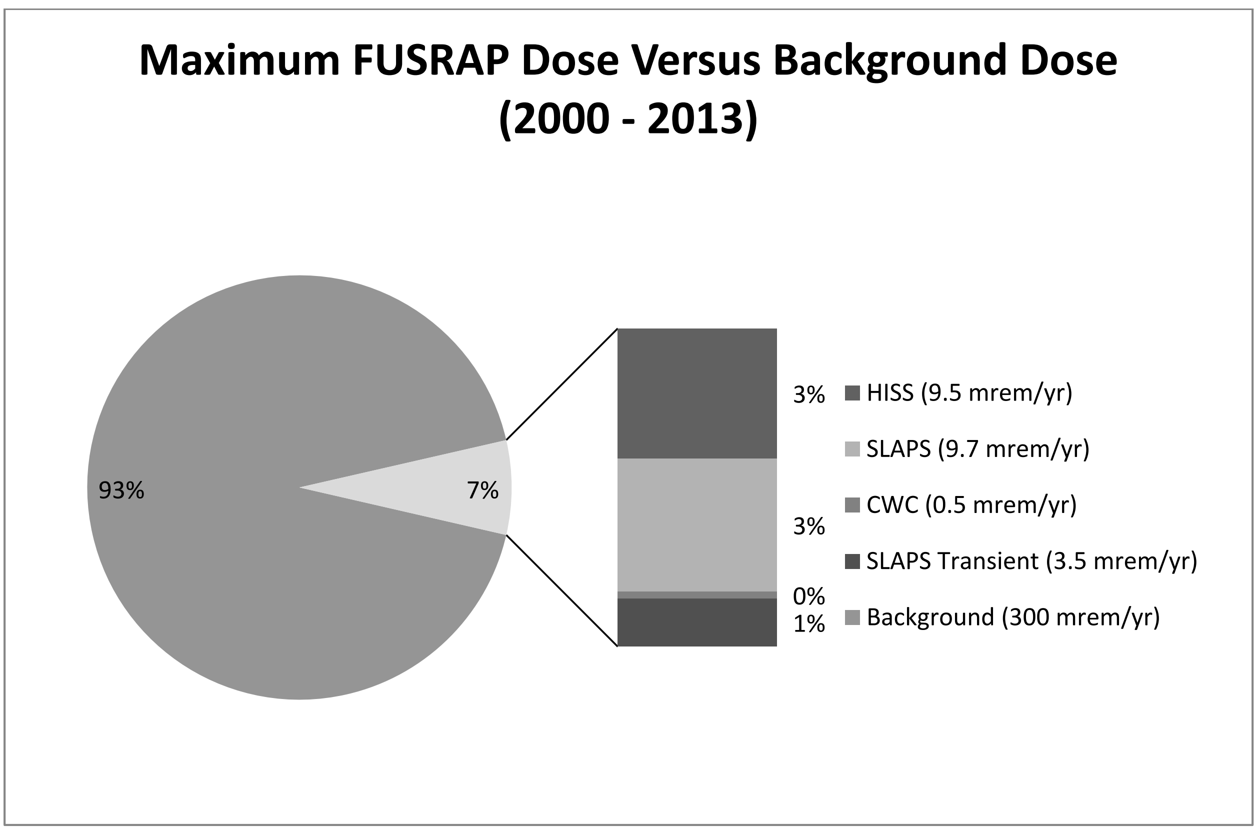


Figure 6-2. St. Louis FUSRAP NC Maximum Dose Versus Background Dose

APPENDIX A

NORTH ST. LOUIS COUNTY FUSRAP SITES
2013 RADIONUCLIDE EMISSIONS NESHAP REPORT

SUBMITTED IN ACCORDANCE WITH REQUIREMENTS OF 40 *CFR* 61, SUBPART I

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ACRONYMS AND ABBREVIATIONS

Both English and metrics 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/cm^3	microcurie(s) per cubic centimeter
µCi/mL	microcurie(s) per milliliter
Ac	actinium
AEC	Atomic Energy Commission
BNI	Bechtal National Inc.
°C	degrees Celsius (centigrade)
CFR	*Code of Federal Regulations*
Ci/yr	curie(s) per year
cm	centimeter(s)
cm^3	cubic centimeter(s)
CWC	Coldwater Creek
CY	calendar year
DOE	U.S. Department of Energy
EDE	effective dose equivalent
ft	foot/feet
FS	*Feasibility Study for the St. Louis North County Site*
FUSRAP	Formerly Utilized Sites Remedial Action Program
Futura	Futura Coatings Company
g	gram(s)
GIS	geographic information system
HEPA	high efficiency particulate air
HISS	Hazelwood Interim Storage Site
IA	investigation area
IAAAP	Iowa Army Ammunition Plant
kg	kilogram(s)
m	meter(s)
m^2	square meter(s)
m/min	meter(s) per minute
m^3/min	cubic meter(s) per minute
MED	Manhattan Engineer District
mL	milliliter(s)
mrem/yr	millirem per year
mSv/yr	millisievert(s) per year
NC	North St. Louis County
NC EMDAR CY 2013	*North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013*
NESHAP	National Emission Standard for Hazardous Air Pollutants
Pa	protactinium
pCi/g	picocurie(s) per gram
Ra	radium
RA	remedial action

ACRONYMS AND ABBREVIATIONS (Continued)

SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SLDS EMDAR CY 2013	*St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013*
STLAA	St. Louis Airport Authority
Th	thorium
U	uranium
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VP	vicinity property
yd^3	cubic yard(s)

EXECUTIVE SUMMARY AND DECLARATION STATEMENT

This report presents the results of National Emission Standard for Hazardous Air Pollutants (NESHAP) calculations for the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) North St. Louis County (NC) Sites for calendar year (CY) 2013. NESHAP requires the calculation of the effective dose equivalent (EDE) from radionuclide emissions to critical receptors. The report follows the requirements and procedures contained in 40 *Code of Federal Regulation* (*CFR*) 61, Subpart I, *National Emission Standards for Radionuclide Emissions from Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H* (USEPA 1989).

This report evaluates sites at which a reasonable potential exists for radionuclide emissions due to St. Louis FUSRAP activities. These sites include: the St. Louis Airport Site (SLAPS), the Investigation Area (IA)-09 (Ballfields), Vicinity Property (VP)-16, and the SLAPS Loadout. This report also evaluates radionuclide emissions from the United States Army Corps of Engineers (USACE) radioanalytical laboratory operations. Emissions from the sites and laboratory were evaluated for the entire CY 2013 to provide a conservative estimate of total emissions.

The NESHAP standard of EDE to a critical receptor from radionuclide emissions is 10 millirem per year (mrem/yr) (0.1 millisievert per year [mSv/yr]). None of the sites exceeded this standard. The EDEs from radionuclide emissions at the sites were calculated using soil characterization data, air particulate monitoring data, and the U.S. Environmental Protection Agency (USEPA) CAP88-PC modeling code, which resulted in an EDE of less than 0.1 mrem/yr (<0.001 mSv/yr) from the SLAPS and SLAPS VPs. The EDE from the laboratory emissions was calculated using the methodology in Appendix D of 40 *CFR* 61, *Methods for Estimating Radionuclide Emissions*, soil characterization data, and the USEPA CAP88-PC modeling code (USEPA 2007), which resulted in an EDE of less than 0.1 mrem/yr (<0.001 mSv/yr).

Evaluations for the SLAPS VPs and the USACE radioanalytical laboratory resulted in less than 10 percent of the dose standard in 40 *CFR* 61.102. These sites are exempt from the reporting requirements of 40 *CFR* 61.104(a).

DECLARATION STATEMENT – 40 CFR 61.104(a)(xvi)

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 *U.S. Code* 1001.

Signature ______________________ Date ____________

Office: U.S. Army Corps of Engineers, St. Louis District Office
Address: 8945 Latty Ave.
Berkeley, MO 63134
Contact: Jon Rankins

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1.0 PURPOSE

This report calculates the EDE from radionuclide emissions (exclusive of radon) to critical receptors from the NC Sites at which a reasonable potential existed for radionuclide emissions due to St. Louis FUSRAP activities. These sites include: the Ballfields, VP-16, the SLAPS Loadout, and the USACE radioanalytical laboratory. The air emissions from the laboratory include fume hood stack releases of particulate radionuclides from sample preparation and separation activities. The air emissions from the other sites are ground releases of particulate radionuclides in soil as a result of windblown action and remedial action (RA) in the form of excavation and off-site disposal of soil.

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2.0 METHOD

Emission rates for the sites were modeled using guidance documents referenced in 40 *CFR* 61, Appendix E, *Compliance Procedures Methods for Determining Compliance with Subpart I* (USEPA 1989), and measured by collection of environmental air samples. Emission rates for the laboratory were modeled using guidance in 40 *CFR* 61 Appendix D, *Methods for Estimating Radionuclide Emissions.* Emission rates were input into the USEPA computer code CAP88-PC, along with appropriate meteorological data and distances to critical receptors[1], to obtain the EDE from the air emissions.

Although 40 *CFR* 61.103 requires the use of the USEPA computer code COMPLY, USEPA no longer supplies technical support for COMPLY. However, the USEPA lists both COMPLY and CAP88-PC as "Atmospheric transport models for assessing dose and risk from radioactive air emissions" (USEPA 2007). The USEPA continues to maintain and update the CAP88-PC modeling program and has updated it as recently as February 9, 2013. In previous FUSRAP NESHAP reports, both COMPLY and CAP88-PC results have been compared. This comparison indicated that CAP88-PC is a comparable and conservative method of demonstrating compliance with 40 *CFR* 61 Subpart I. For these reasons, CAP88-PC was used in this report to demonstrate compliance with the NESHAP standard.

2.1 EMISSION RATE

Two methods were used to determine particulate radionuclide emission rates from the sites: (1) 40 *CFR* 61 Appendix D, *Methods for Estimating Radionuclide Emissions*, and (2) environmental air samples collected from the perimeter of a site. Emissions during excavations and waste loadout were evaluated using air sampling data at the excavation and waste loadout perimeters.

2.2 EFFECTIVE DOSE EQUIVALENT

The EDE to critical receptors[1] is obtained using USEPA computer code CAP88-PC, Version 3.0 (USEPA 2007). CAP88-PC uses a Gaussian plume equation to estimate the dispersion of radionuclides and is referenced by the USEPA to demonstrate compliance with the NESHAP emissions criterion in 40 *CFR* 61. An area ground release at a height of 3.3 feet (ft) (1 meter [m]) is modeled for the sites, and a stack release was modeled for the laboratory.

The EDE is calculated by combining doses from ingestion, inhalation, air immersion, and external ground surface. CAP88-PC contains historical weather data libraries for major airports across the country, and the results can be modeled for receptors at multiple distances from the emissions source.

[1] "Critical receptors," as used in this report, are the locations for the nearest residence, school, business, and farm.

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3.0 METEOROLOGICAL DATA

Meteorological data were obtained from the CAP88-PC code for the Lambert – St. Louis International Airport (wind file 13994.WND). Data in the file were accumulated from 1988 through 1992.

- Average Annual Wind Velocity: 4.446 m per second
- Average Annual Precipitation Rate: 111 centimeters (cm) per year
- Average Annual Air Temperature: 14.18 degrees Celsius (centigrade) (°C)

Wind speed frequency data was obtained from Lambert – St. Louis International Airport (see Table A.3-1).

Table A.3-1. St. Louis Wind Speed Frequency

Wind Speed Group, Knots[a]	Frequency
0 – 3	0.10
4 – 7	0.29
8 – 12	0.36
13 – 18	0.21
19 – 24	0.03
25 – 31	0.01

[a] knot – 1.151 miles per hour

Wind direction frequency was obtained from the CAP88-PC wind file, 13994.WND (see Table A.3-2).

Table A.3-2. St. Louis Wind Rose Frequency

Wind Direction (wind toward)	Wind From	Wind Frequency	Wind Direction (wind toward)	Wind From	Wind Frequency
N	S	0.131	S	N	0.056
NNW	SSE	0.074	SSE	NNW	0.043
NW	SE	0.068	SE	NW	0.061
WNW	ESE	0.069	ESE	WNW	0.087
W	E	0.055	E	W	0.090
WSW	ENE	0.028	ENE	WSW	0.068
SW	NE	0.031	NE	SW	0.054
SSW	NNE	0.037	NNE	SSW	0.050

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4.0 LATTY AVENUE PROPERTIES UNDER ACTIVE REMEDIATION

4.1 SITE HISTORY

In 1966, Continental Mining and Milling Company of Chicago, Illinois, purchased the wastes stored at the SLAPS and began moving them to a property at 9200 Latty Avenue for storage. In 1967, the Commercial Discount Corporation of Chicago, Illinois, purchased the residues, dried the materials, and shipped much of the material to Canon City, Colorado. Cotter Corporation purchased the remaining residues in 1969 and dried and shipped more material to Canon City during 1970. In 1973, the remaining undried material was shipped to Canon City, and leached barium sulfate was mixed with soil and transported to a St. Louis County landfill. During these activities, improper storage, handling, and transportation of materials caused the spread of materials along haul routes and to the adjacent VPs.

In 1979, the owner of the 9200 Latty Avenue property excavated approximately 13,000 cubic yards (yd^3) (9,939 m^3) from the western half of the property prior to constructing a manufacturing facility. The material excavated at this time was stockpiled on the eastern half of the property, which now constitutes the Hazelwood Interim Storage Site (HISS). In 1984, Bechtel National Inc. (BNI) performed removal actions, including clearing, cleanup, and excavation of the property at 9200 Latty Avenue and the surrounding VPs. This action created approximately 14,000 yd^3 (10,704 m^3) of additional contaminated soil, which was stockpiled on the HISS.

In 1986, the U.S. Department of Energy (DOE) provided radiological support to the cities of Hazelwood and Berkeley for a drainage and road improvement project. Soil with constituents in excess of DOE RA guidelines was excavated and stored at the HISS. This action resulted in an additional 4,600 yd^3 (3,517 m^3) of material being placed at the HISS in a supplemental storage pile.

In 1996, the owner of the property to the east of the HISS, General Investment Funds Real Estate Holding Company, in consultation with the DOE, made commercial parking and drainage improvements on the property. This action resulted in the stockpiling of approximately 8,000 yd^3 (6,116 m^3) of soil and debris in two interim storage piles located in the southwestern portion of the Latty Avenue VP-02(L). These piles were referred to as the Eastern Piles.

In 2000 and 2001, the USACE removed the Main, Supplemental, and Eastern Piles and shipped the material by rail to properly permitted disposal facilities. The ground surface on which the piles were previously located was covered by a layer of plastic and approximately 6 inches (15 cm) of gravel.

4.2 MATERIAL HANDLING AND PROCESSING FOR CALENDAR YEAR 2013

Soil cleanup activities at the HISS and the Futura Coatings Company (Futura), which were the Latty Avenue Properties with the highest initial levels of residual contamination, were completed in CY 2011. No excavation or loadout activities for the Latty Avenue Properties occurred in CY 2013; therefore, radioactive particulate emissions were considered negligible, air sampling for particulate radionuclides was not conducted, and NESHAP calculations for these properties were not required.

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5.0 ST. LOUIS AIRPORT SITE AND ST. LOUIS AIRPORT SITE VICINITY PROPERTIES UNDER ACTIVE REMEDIATION

5.1 SITE HISTORY

The Manhattan Engineer District (MED) acquired the SLAPS in 1946 to store uranium-bearing residuals generated at the St. Louis Downtown Site (SLDS) from 1946 until 1966. In 1966, these residuals were purchased by Continental Mining and Milling Company of Chicago, removed from the SLAPS, and placed in storage at the 9200 Latty Avenue (HISS) under an Atomic Energy Commission (AEC) license. After most of the residuals were removed, site structures were demolished and buried on the property, along with approximately 60 truckloads of scrap metal and a vehicle that had become contaminated. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership from the AEC to the St. Louis Airport Authority (STLAA). The USACE conducted cleanup operations on the SLAPS from 1998 to 2007. Although excavations have concluded at the SLAPS, a small portion of the site is still used to conduct waste storage and loadout activities.

5.2 MATERIAL HANDLING AND PROCESSING FOR CALENDAR YEAR 2013

During CY 2013, excavations were conducted on the Ballfields and VP-16, and waste loadout activities were conducted at the SLAPS Loadout facility. Air particulate samples were collected around excavation perimeters during active excavation on the SLAPS VPs and around the SLAPS Loadout area throughout CY 2013. Analytical results of air particulate samples were used to determine windblown in situ emissions.

5.3 SOURCE DESCRIPTION – RADIONUCLIDE SOIL CONCENTRATIONS

The radionuclide concentrations for each site were obtained from data contained in Table D-5 of the *Feasibility Study for the St. Louis North County Site* (FS) (USACE 2003). Attachment A-1 of this report contains a summary table of the radionuclide concentrations used to calculate the emission rate from the site.

5.4 LIST OF ASSUMED AIR RELEASES FOR CALENDAR YEAR 2013

Ground releases of particulate radionuclides in soil, as a result of windblown action and RA in the form of excavation and off-site disposal of soil, are assumed for the particulate radionuclide emission determinations from the SLAPS VPs at which excavations occurred in CY 2013. Other SLAPS VPs do not contribute to the emission determinations for periods of inactivity due to the low activity and vegetative cover.

5.5 DISTANCES TO CRITICAL RECEPTORS

The distances to critical receptors are shown on Figure A-1 and presented in Table A.5-1. Distances and directions to critical receptors are determined by using tools in a geographic information system (GIS).

Table A.5-1. SLAPS Critical Receptors for CY 2013

Sources	Resident		Farm		Business		School	
	Dist.[a]	Dir.[a]	Dist.[a]	Dir.[a]	Dist.[a,b]	Dir.[a]	Dist.[a]	Dir.[a]
Ballfields	490	NE	1,485	NE	775	WSW	2,265	E
VP-16	425	N	1,425	NNE	1,060	W	1,915	W
SLAPS Loadout	770	NE	1,710	NE	500	WSW	2,580	E

[a] Dist. – Distance in m; Dir. – Direction.
[b] Distance from business receptor to fenceline is 525 ft (160 m). Distance from business receptor to center of source from the SLAPS Loadout is 1,640 ft (500 m) for emissions determination.

5.6 EMISSIONS DETERMINATION

5.6.1 Measured Airborne Radioactive Particulate Emissions

Particulate air samples were collected from four locations around the perimeter of the SLAPS Loadout to measure the radionuclide emissions. The samples provide the basis for determining the radionuclide emission rates during all of CY 2013. The average gross alpha and gross beta concentrations in microcuries per milliliter (μCi/mL) are determined for each sample location for CY 2013. The site average concentrations are presented in Table A.5-2.

Table A.5-2. SLAPS Average Gross Alpha and Beta Airborne Particulate Emissions for CY 2013

Monitoring Location	Average Concentration (μCi/mL)	
	Gross Alpha	Gross Beta
Ballfields	5.12E-15	3.52E-14
VP-16	2.30E-15	1.67E-14
SLAPS Loadout	3.65E-15	3.22E-14
Background Concentration[a]	3.68E-15	2.06E-14

[a] These concentrations are provided only for informational purposes. As a conservative approach, background values were not subtracted from the gross average concentration during the determination of EDE.

Radionuclide activity fractions are determined for alpha and beta from the average radionuclide concentration data contained in Table D-5 of the FS (USACE 2003). The product of each radionuclide activity fraction and the gross concentration provide the radionuclide emission concentration as measured in microcuries per cubic centimeters (μCi/cm^3). The gross average concentration (in μCi/cm^3) is converted to a release (emission) rate (in curies per year [Ci/yr]) using Equations 1 and 2. The emission rates are summarized in Table A.5-5.

USEPA 1989 (page 3-21, [2]) includes Equation 1 for determination of the effective diameter of a non-circular stack or vent.

$$D = (1.3\ A)^{1/2}$$ **Equation 1**

where:

D is the effective diameter of the release (in m), and
A is the area of the stack, vent, or release point (in square meters [m^2]).

Table A.5-3 provides the effective surface area available for release of airborne radionuclides normalized to 1 year and the effective diameter for the SLAPS and SLAPS VPs that were excavated in CY 2013. Calculation of the effective surface area can be referenced in Attachment A-1 of this report.

Table A.5-3. SLAPS/SLAPS VPs Excavation Effective Areas and Effective Diameters for CY 2013

Location	Effective Area (m^2)	Effective Diameters (m)
Ballfields	828	33
VP-16	5	2
SLAPS Loadout	600	28

The average annual wind speed for the Lambert – St. Louis International Airport is provided in CAP88-PC as 14.578 ft (4.446 m) per second. Conversion of this wind speed to a flow rate through stacks with the listed effective diameters for each area is completed using Equation 2.

$$V = (4)\ F / \pi\ (D)^2$$ **Equation 2**

where:

V is the wind velocity (in meters per minute [m/min]) = 875.20 ft (266.76 m)/min,
F is the flow rate (in cubic meters per minute [m^3/min]),
π is a mathematical constant, and
D is the effective diameter of the release determined using Equation 1 (in m).

Converting the velocity of emissions from the sites to an effective flow rate results in the following site release flow rates for the SLAPS and SLAPS VPs areas as listed in Table A.5-4. The product of the flow rate, the activity fraction associated with each radionuclide, and the appropriate conversion factors provide the site emission rate for each radionuclide as illustrated in Table A.5-5. Attachment A-1 of this report can be referenced for flow rate and average radionuclide concentration data.

Table A.5-4. SLAPS/SLAPS VPs Site Release Flow Rates for CY 2013

Location	Site Release Flow Rate (m^3/min)
Ballfields	2.3E+05
VP-16	1.3E+03
SLAPS Loadout	1.6E+05

5.6.2 St. Louis Airport Site and St. Louis Airport Site Vicinity Properties Total Airborne Radioactive Particulate Emission Rates

The SLAPS and SLAPS VPs' total CY 2013 emission/release rates that were input into the USEPA codes are shown in Table A.5-5 and are based on the measured emission rates from the air samples collected from the perimeter of the site or excavations as appropriate.

Table A.5-5. SLAPS/SLAPS VPs Total Airborne Radioactive Particulate Emission Rates for CY 2013

Radionuclide	Emission (Ci/yr)[a]		
	Ballfields	VP-16	SLAPS Loadout
Uranium (U)-238	3.0E-05	1.8E-08	1.4E-05
U-235	3.9E-06	7.8E-10	1.9E-06
U-234	3.0E-05	1.8E-08	1.4E-05
Radium (Ra)-226	1.5E-05	1.0E-08	7.1E-06
Thorium (Th)-232	7.6E-06	1.5E-09	3.6E-06
Th-230	4.7E-04	1.5E-06	2.3E-04
Th-228	7.0E-06	1.5E-09	3.3E-06

Table A.5-5. SLAPS/SLAPS VPs Total Airborne Radioactive Particulate Emission Rates for CY 2013 (Continued)

Radionuclide	Emission (Ci/yr)[a]		
	Ballfields	VP-16	SLAPS Loadout
Ra-224	7.0E-06	1.5E-09	3.3E-06
Th-234	1.7E-03	5.4E-06	1.1E-03
Protactinium (Pa)-234m	1.7E-03	5.4E-06	1.1E-03
Th-231	2.3E-04	2.4E-07	1.5E-04
Ra-228	2.6E-04	1.6E-07	1.7E-04
Actinium (Ac)-228	2.6E-04	1.6E-07	1.7E-04
Pa-231	2.7E-05	1.2E-08	1.3E-05
Ac-227	2.4E-05	1.0E-08	1.1E-05

[a] Release rate based on a 365-day period at a respective flow rate (as presented in Table A.5-4) as determined from the average annual wind speed (14.587 ft [4.446 m] per second) and the effective site area (as presented in Table A.5-3) for each location.

5.7 CAP88-PC RESULTS

The CAP88-PC report is contained in Attachment A-2 of this report. The effective area factor input was taken from Table A.5-3. Results show compliance with the 10 mrem/yr (0.1 mSv/yr) criterion for all critical receptors. Table A.5-6 summarizes the results.

Table A.5-6. SLAPS/SLAPS VPs CAP88-PC Results for Critical Receptors for CY 2013

Source	Dose (mrem/yr)			
	Resident[a]	School[b]	Business[b]	Farm[a]
Ballfields	<0.1	<0.1	<0.1	<0.1
VP-16	<0.1	<0.1	<0.1	<0.1
SLAPS Loadout[c]	<0.1	<0.1	<0.1	<0.1
SLAPS/SLAPS VPs	<0.1	<0.1	<0.1	<0.1

[a] Occupancy factor is 100 percent for resident and farm.
[b] Corrected for the 23 percent occupancy factor (50 weeks per year, 40 hours per week).
[c] Distance from business receptor to fenceline is 525 ft (160 m). Distance from business receptor to center of source is 1,640 ft (500 m) for emissions determination.

6.0 U.S. ARMY CORPS OF ENGINEERS RADIOANALYTICAL LABORATORY

6.1 SITE DESCRIPTION

The USACE radioanalytical laboratory is located on VP-38. VP-38 is a SLAPS VP owned by SuperValue Inc. The USACE radioanalytical laboratory is bounded on the north, east, and west by SuperValue Inc. property and on the south by Latty Avenue. The laboratory site covers approximately 1 acre (4,047 m^2) of VP-38.

6.2 LIST OF ASSUMED AIR RELEASES FOR CALENDAR YEAR 2013

Emissions from the USACE radioanalytical laboratory operations are assumed for the particulate radionuclide emission determinations from the laboratory site. No active excavations occurred on VP-38 during CY 2013.

6.3 EFFLUENT CONTROLS

The effluent controls at the USACE radioanalytical laboratory during operations include performing all radioanalytical activities in fume hoods that exhaust to the outside air after passing through a high efficiency particulate air (HEPA) filter.

6.4 DISTANCES TO CRITICAL RECEPTORS

The distances to critical receptors are shown on Figure A-2 and listed in Table A.6-1. Distances and directions to critical receptors are determined by using tools in a GIS.

Table A.6-1. Laboratory Critical Receptors for CY 2013

Receptor	Distance (m)	Direction from Site
Nearest Resident	330	NE
School	1,830	SE
Business	110	S
Farm	310	NE

6.5 EMISSIONS DETERMINATIONS

6.5.1 Stack Emissions from U.S. Army Corps of Engineers Laboratory Operations

Two potential sources of emissions from laboratory operations exist:

1. The drying and grinding operations for soil samples, and
2. The dissolution of soil and water samples.

To obtain an estimate of the emissions that these operations can cause, the methodology in Appendix D of 40 *CFR* 61, *Methods for Estimating Radionuclide Emissions,* was utilized. For the drying and grinding operations, a factor of 0.001 (applicable to liquids and powders) was applied to the entire annual laboratory inventory to determine the emissions for the year. For the dissolution operation; however, only 5 grams (g) of any sample are used. Because the dissolution involved heating samples to near boiling temperatures, no adjustment was made to the dissolution inventory to determine the emissions (a factor of 1.0 as specified in Appendix D). To account for the small aliquot utilized, the annual inventory was adjusted by a factor of 0.005 (the ratio of the 5-g aliquot to the 1-kilogram [kg] sample mass) to estimate emissions. The two emission sources were then summed to determine the total laboratory source term.

Note that no credit is taken for emission controls serving the drying and grinding operations, even though Appendix D of 40 *CFR* 61 allows for credit to be taken for the HEPA filters installed on the grinder equipment. The calculated source term therefore provides a conservative basis on which to determine compliance with USEPA guidance in 40 *CFR* 61.

To determine whether the laboratory complies with the 10 mrem/yr (0.1 mSv/yr) limit specified in 40 *CFR* 61, Subpart I, the annual inventory handled by the laboratory had to be determined. The actual number of samples handled by the laboratory was reported as shown in Table A.6-2. With this data, the following equation was used to calculate laboratory emissions from the operations conducted in CY 2013.

$$Emission\ Rate\,(Ci/yr) = C * \left\lfloor N_1 * F_1 + N_2 * F_2 \right\rfloor * 1{,}000\ grams/sample\ *\ 1\,E-12\,(curies\ per\ picocuries)$$

where:

C = the concentration of a radionuclide of concern in a sample type (in picocuries per gram [pCi/g])

N_1 = the number of samples involved in a drying/grinding operation

N_2 = the number of samples involved in a separations operation

F = the appropriate correction factor (i.e., 0.001 for drying/grinding [F_1] or 0.005 for dissolution [F_2])

Table A.6-2. Laboratory Annual Sample Inventory for CY 2013

Site	Type	Gamma Spectroscopy	Isotopic Ra[a]	Isotopic Th[a]	Isotopic U[a]	Total Drying and Grinding[b]	Total Separations[c]
HISS	soil	0	0	0	0	0	0
HISS	water	0	9	9	9	0	27
Latty Avenue Properties	soil	106	0	106	0	106	106
Latty Avenue Properties	water	0	0	0	0	0	0
Iowa Army Ammunition Plant (IAAAP)	soil	496	0	0	488	496	488
IAAAP	water	0	0	0	0	0	0
SLAPS	soil	0	0	0	0	0	0
SLAPS	water	1	9	9	9	1	27
SLAPS VPs	soil	1,871	0	1,980	0	1,871	1,980
SLAPS VPs	water	0	23	23	3	0	49
Coldwater Creek (CWC)	sediment (soil)	1,395	0	1,191	0	1,395	1,191
CWC	water	0	14	14	14	0	42
SLDS	soil	836	0	816	0	836	816
SLDS	water	0	70	70	8	0	148
		HISS and Latty Avenue Properties			**Total**	106	133
		IAAAP			**Total**	496	488
		SLAPS, SLAPS VPs, and CWC			**Total**	3,266	3,289
		SLDS			**Total**	836	964

[a] Assumes isotopic Ra, Th, and U occur in separate and distinct processes.
[b] Assumes all soil samples went through a drying/grinding process.
[c] Assumes all soil and water samples for isotopic Ra, Th, and U went through a separations process.
Note: CWC samples use SLAPS characterization data to determine release rates.

6.5.2 Laboratory Total Airborne Radioactive Particulate Emission Rates

The laboratory total CY 2013 emission rate was input into the USEPA CAP88-PC code. The total emission rates are shown in Table A.6-3 as the calculated emissions from laboratory operations. The result was then used to calculate total dose to the hypothetical maximally exposed receptor. Calculation of emission rates can be referenced in Attachment A-1 of this report.

Table A.6-3. Laboratory Total Airborne Radioactive Particulate Emission Rates for CY 2013

Radionuclide	Emission (Ci/yr)[a]
U-238	9.1E-07
U-235	4.0E-08
U-234	6.5E-07
Ra-226	1.7E-07
Th-232	6.0E-08
Th-230	1.4E-06
Th-228	3.9E-08
Ra-224	3.9E-08
Th-234	9.1E-07
Pa-234m	9.1E-07
Th-231	4.0E-08
Ra-228	3.3E-08
Ac-228	3.3E-08
Pa-231	1.0E-07
Ac-227	9.2E-08

[a] Total emission rate is the sum of individual emission rates that were determined by using the calculation in Section 6.5.1 of this attachment.

6.6 CAP88-PC RESULTS

The CAP88-PC report is contained in Attachment A-2 of this report. The stack factor input was 10 ft (3 m) high and 1.0 ft (0.3 m) in diameter. This evaluation demonstrates that all USACE radioanalytical laboratory critical receptors receive less than 10 percent of the dose standard in 40 *CFR* 61.102, and therefore, the laboratory is exempt from the reporting requirement of 40 *CFR* 61.104(a). Table A.6-4 summarizes the results.

Table A.6-4. Laboratory CAP88-PC Results for Critical Receptors for CY 2013

Receptor	Distance (m)	Direction from Site	Dose (mrem/yr)
Nearest Resident[a]	330	NE	<0.1
School[b]	1,830	SE	<0.1
Business[b]	110	S	<0.1
Farm[a]	310	NE	<0.1

[a] Occupancy factor is 100 percent for resident and farm.
[b] Corrected for the 23 percent occupancy factor (50 weeks per year; 40 hours per week).

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7.0 REFERENCES

USACE 2003. U.S. Army Corps of Engineers, St. Louis District Office. *Feasibility Study for the St. Louis North County Site*. Final. May.

USACE 2014a. *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013,* St. Louis Missouri. Revision A. April 30.

USACE 2014b. *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013*, St. Louis Missouri. Revision A. April 30.

USEPA 1989. U.S. Environmental Protection Agency, Office of Radiation Programs, Washington, D.C. *A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions From NRC-Licensed and Non-DOE Federal Facilities*. EPA 520/1-89-002. October.

USEPA 2007. CAP88-PC Version 3.0 Computer Code, U.S. Environmental Protection Agency. December.

40 *CFR* 61, Subpart I. *National Emission Standards for Radionuclide Emissions From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H*.

40 *CFR* 61, Appendix D. *Methods for Estimating Radionuclide Emissions.*

40 *CFR* 61, Appendix E. *Compliance Procedures Methods for Determining Compliance with Subpart I*.

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APPENDIX A

FIGURES

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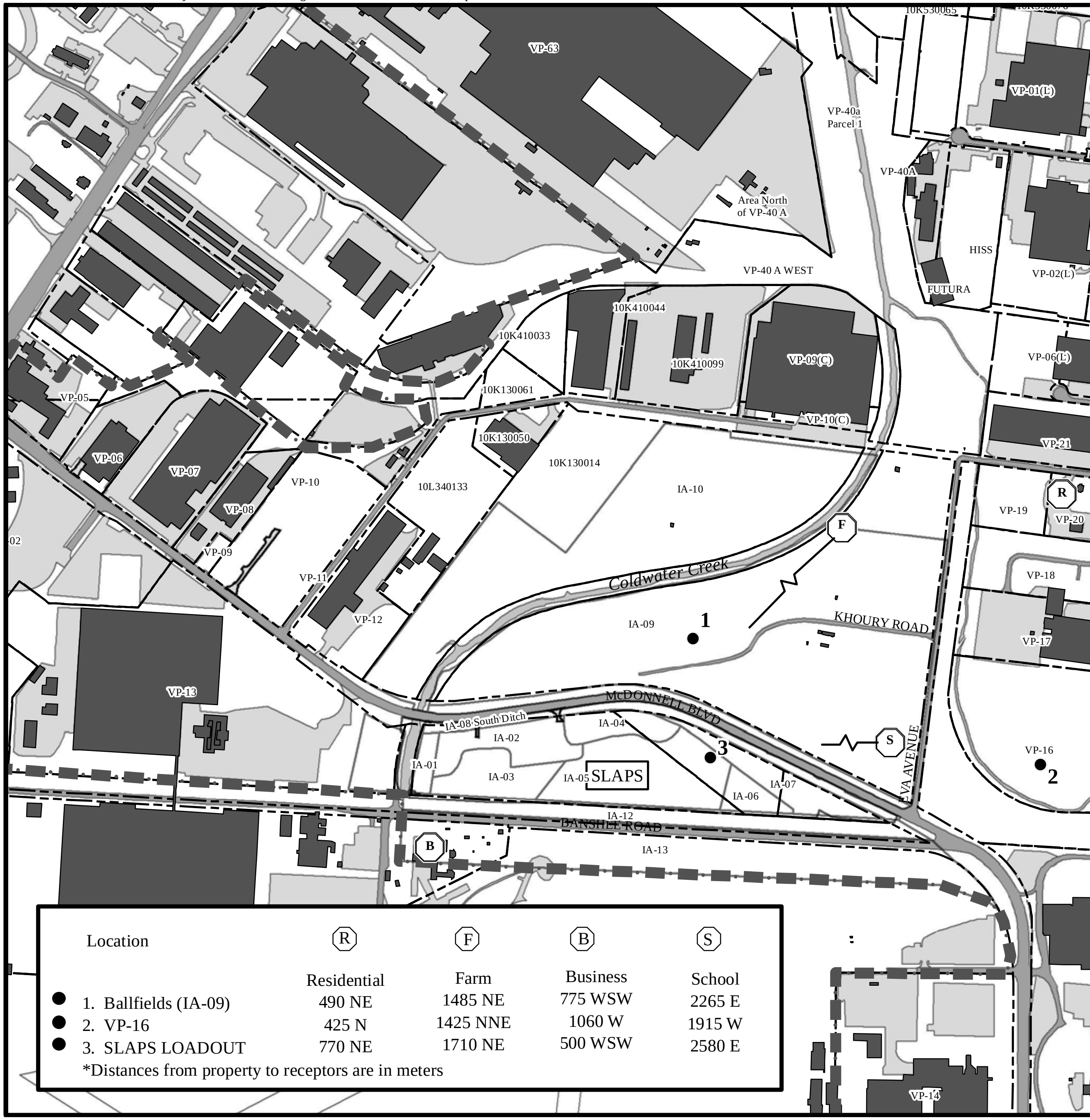

Location	(R) Residential	(F) Farm	(B) Business	(S) School
1. Ballfields (IA-09)	490 NE	1485 NE	775 WSW	2265 E
2. VP-16	425 N	1425 NNE	1060 W	1915 W
3. SLAPS LOADOUT	770 NE	1710 NE	500 WSW	2580 E

*Distances from property to receptors are in meters

LEGEND:

- Parcel Boundaries
- ROD Boundary
- Buildings
- Parking Lots
- Road
- River/Stream

N E S W

MO-East State Plane
(NAD 83, Feet)

0 115 230 Meters

Figure A-1.
SLAPS and SLAPS VPs
Critical Receptors

FUSRAP

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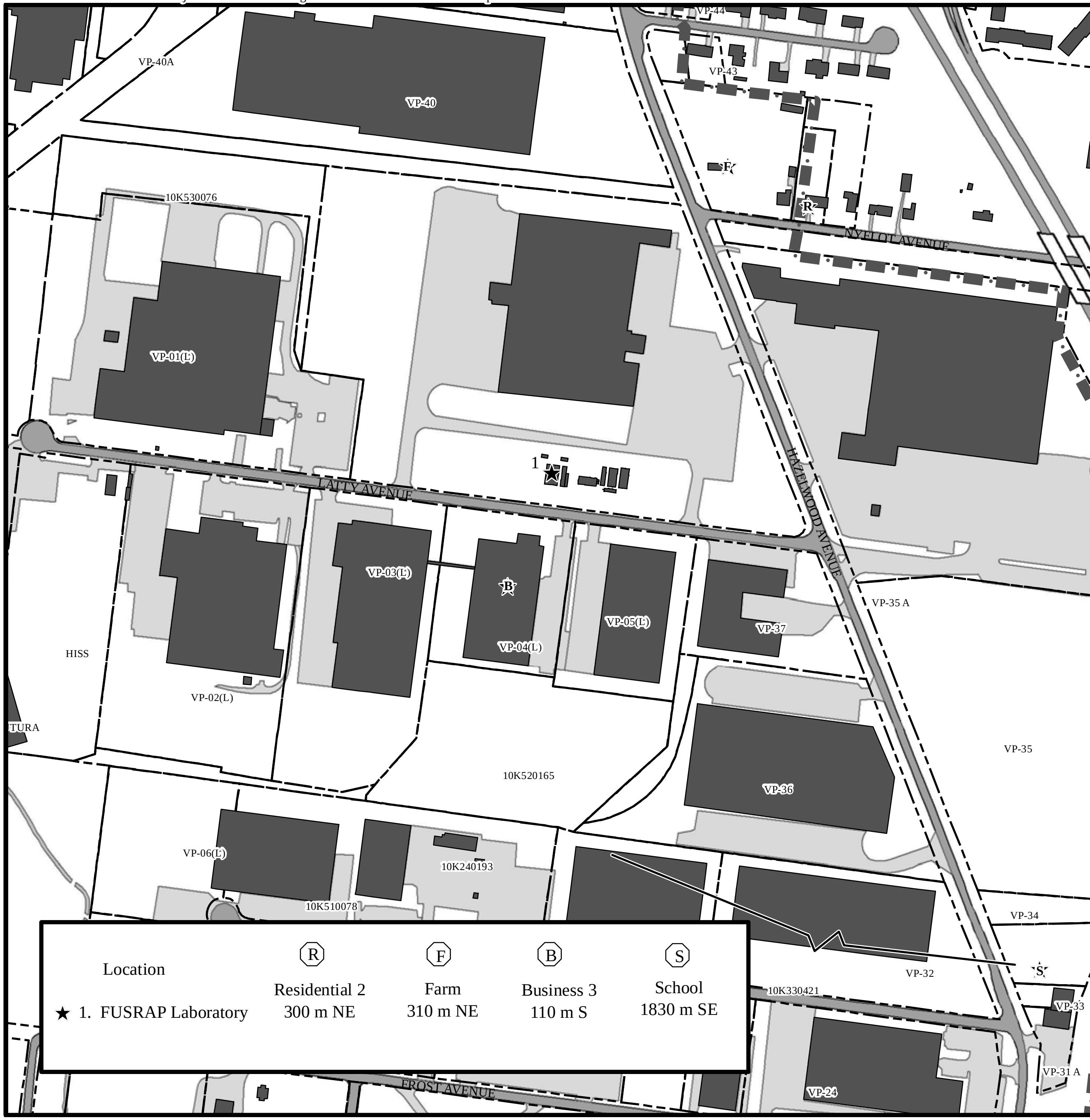

Location	Ⓡ Residential 2	Ⓕ Farm	Ⓑ Business 3	Ⓢ School
★ 1. FUSRAP Laboratory	300 m NE	310 m NE	110 m S	1830 m SE

LEGEND:

- ROD Boundary
- Buildings
- Parcel Boundaries
- Parking Lots
- Road
- River/Stream

N
W E
S

MO-East State Plane
(NAD 83, Feet)

0 75 150 Meters

Figure A-2.
FUSRAP
Laboratory Critical Receptors

FUSRAP

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ATTACHMENT A-1

CALCULATED EMISSION RATES FROM NORTH ST. LOUIS COUNTY SITES PROPERTIES

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Table A1-1. SLAPS Properties Soil Radionuclide Concentrations for CY 2013

Property	Ballfields	VP-16	SLAPS Loadout
Radionuclide	Average Concentration (pCi/g)[a]		
U-238	6.6	0.1	3.3
U-235	0.9	0.003	0.4
U-234	6.6	0.06	3.3
Ra-226	3.3	0.03	1.7
Ra-228	1.0	0.002	0.5
Th-232	1.7	0.005	0.9
Th-230	105	5.0	55
Th-228	1.6	0.005	0.8
Pa-231	6.1	0.04	3.0
Ac-227	5.3	0.03	2.7

[a] Radionuclides and concentrations from the FS, Appendix D, Attachment 5 (USACE 2003).

Table A1-2. SLAPS Properties Average Gross Alpha and Beta Airborne Particulate Emissions for CY 2013

Location	Average Concentration (µCi/mL) for Location[a]	
	Gross Alpha	Gross Beta
Ballfields	5.12E-15	3.52E-14
VP-16	2.30E-15	1.67E-14
SLAPS Loadout	3.65E-15	3.22E-14
Background Concentration[b]	3.68E-15	2.06E-14

[a] Average concentration values for the sampling period by location.
[b] Negative gross alpha values were less than the laboratory instrument background value and were reported as zero.

Table A1-3. SLAPS Properties Excavation Data for CY 2013

Location	Area (m^2)	Excavation Start Date	Excavation End Date
Ballfields - SU-8B[a]	347	01/01/13	01/10/13
Ballfields - SU-8C	347	01/07/13	02/20/13
Ballfields - SU-8D	460	02/18/13	03/26/13
Ballfields - SU-10A	247	07/31/13	08/28/13
Ballfields - SU-10B	1,100	08/12/13	10/01/13
Ballfields - SU-9A	488	06/05/13	06/20/13
Ballfields - SU-9B	812	06/10/13	07/11/13
Ballfields - SU-11x (Area 5 - South)[a]	1,484	09/09/13	12/31/13
VP-16 - SU-1H[a]	30	01/01/13	01/07/13
VP-16 - SU-1J[a]	2	01/01/13	01/07/13
VP-16 - SU-1K	36	01/09/13	01/10/13
VP-16 - SU-3	131	05/20/13	05/30/13
SLAPS Loadout[a]	600	01/01/13	12/31/13

[a] Open/close dates set to start or stop at the calendar year boundary.

Table A1-4. SLAPS Properties Average Surface Area and Flow Rate per Location for CY 2013

Location	Total Days	Surface Area * Total Days	Average Surface Area/yr (m2)	Diameter of Stack $D=(1.3*A)^{1/2}$(m)	Flow Rate $F=V*Pi*(D)^2/4$ (m^3/min.)
Ballfields					
SU-8B	10	3,473			
SU-8C	45	15,618			
SU-8D	37	17,020			
SU-10A	29	7,151			
SU-10B	51	56,114			
SU-9A	16	7,808			
SU-9B	32	25,983			
SU-11x (Area 5 - South)	114	169,211			
	Total	**302,378**	828	33	**2.3E+05**
VP-16					
SU-1H	7	209			
SU-1J	7	14			
SU-1K	2	72			
SU-3	11	1,441			
	Total	**1,737**	5	2	**1.3E+03**
SLAPS Loadout					
SLAPS Loadout	365	219,000			
	Total	**219,000**	600	28	**1.6E+05**

Table A1-5. SLAPS Properties Airborne Radioactive Particulate Emissions Based on Site Perimeter Air Samples for CY 2013[a]

Property	Ballfields			VP-16			SLAPS Loadout		
Radionuclide	Activity Fraction[a]	Emission Conc. (µCi/cm^3)[b]	Release Rate (Ci/yr)[c]	Activity Fraction[a]	Emission Conc. (µCi/cm^3)[b]	Release Rate (Ci/yr)[c]	Activity Fraction[a]	Emission Conc. (µCi/cm^3)[b]	Release Rate (Ci/yr)[c]
U-238	0.05	2.5E-16	3.0E-05	0.01	2.6E-17	1.8E-08	0.05	1.7E-16	1.4E-05
U-235	0.01	3.3E-17	3.9E-06	0.0005	1.1E-18	7.8E-10	0.01	2.2E-17	1.9E-06
U-234	0.05	2.5E-16	3.0E-05	0.01	2.6E-17	1.8E-08	0.05	1.7E-16	1.4E-05
Ra-226	0.02	1.2E-16	1.5E-05	0.01	1.5E-17	1.0E-08	0.02	8.4E-17	7.1E-06
Th-232	0.01	6.3E-17	7.6E-06	0.001	2.2E-18	1.5E-09	0.01	4.3E-17	3.6E-06
Th-230	0.76	3.9E-15	4.7E-04	0.95	2.2E-15	1.5E-06	0.76	2.8E-15	2.3E-04
Th-228	0.01	5.8E-17	7.0E-06	0.001	2.2E-18	1.5E-09	0.01	4.0E-17	3.3E-06
Ra-224[d]	0.01	5.8E-17	7.0E-06	0.001	2.2E-18	1.5E-09	0.01	4.0E-17	3.3E-06
Th-234[d]	0.41	1.4E-14	1.7E-03	0.48	8.0E-15	5.4E-06	0.41	1.3E-14	1.1E-03
Pa-234m[d]	0.41	1.4E-14	1.7E-03	0.48	8.0E-15	5.4E-06	0.41	1.3E-14	1.1E-03
Th-231[d]	0.05	1.9E-15	2.3E-04	0.02	3.4E-16	2.4E-07	0.05	1.7E-15	1.5E-04
Ra-228	0.06	2.2E-15	2.6E-04	0.01	2.4E-16	1.6E-07	0.06	2.0E-15	1.7E-04
Ac-228[d]	0.06	2.2E-15	2.6E-04	0.01	2.4E-16	1.6E-07	0.06	2.0E-15	1.7E-04
Pa-231	0.04	2.2E-16	2.7E-05	0.01	1.8E-17	1.2E-08	0.04	1.5E-16	1.3E-05
Ac-227	0.04	2.0E-16	2.4E-05	0.01	1.5E-17	1.0E-08	0.04	1.4E-16	1.1E-05

[a] Derived from the average soil radionuclide concentrations from the FS, Table D-5 (USACE 2003). Average soil radionuclide concentrations are presented in Table A1-1. Activity fractions have been rounded; non-rounded values were used in calculations.
[b] Emission concentration is equal to the activity fraction * the gross alpha or gross beta airborne particulate concentrations listed in Table A1-2.
[c] Release rate based on 365-day period at measured flow rate (Table A1-4) for each site as determined from the average annual wind speed (14.587 ft [4.446 m] per second) and calculated site area (Table A1-4). (Note: 1 milliliter [mL] = 1 cubic centimeter [cm^3]).
[d] Note: When data were not available, the radionuclide was assumed to be in secular equilibrium with the parent.

Table A1-6. FUSRAP Laboratory Lab Analyses for CY 2013[a]

Site	Type	Gamma Spectroscopy	Isotopic Ra[b]	Isotopic Th[b]	Isotopic U[b]	Total Drying and Grinding[c]	Total Separations[d]
HISS	soil	0	0	0	0	0	0
HISS	water	0	9	9	9	0	27
Latty Avenue Properties	soil	106	0	106	0	106	106
Latty Avenue Properties	water	0	0	0	0	0	0
IAAAP	soil	496	0	0	488	496	488
IAAAP	water	0	0	0	0	0	0
SLAPS	soil	0	0	0	0	0	0
SLAPS	water	1	9	9	9	1	27
SLAPS VPs	soil	1,871	0	1,980	0	1,871	1,980
SLAPS VPs	water	0	23	23	3	0	49
CWC	sediment (soil)	1,395	0	1,191	0	1,395	1,191
CWC	water	0	14	14	14	0	42
SLDS	soil	836	0	816	0	836	816
SLDS	water	0	70	70	8	0	148
		HISS and Latty Avenue Properties			**Total**	106	133
		IAAAP			**Total**	496	488
		SLAPS, SLAPS VPs, and CWC			**Total**	3,266	3,289
		SLDS			**Total**	836	964

[a] Data provided by the USACE radioanalytical laboratory for CY 2013.
[b] Assumes isotopic Ra, Th, and U occur in separate and distinct processes.
[c] Assumes all soil samples went through a drying/grinding process.
[d] Assumes all soil and water samples for isotopic Ra, Th, and U went through a separations process.
Note: CWC samples use SLAPS characterization data to determine release rates.

Table A1-7. SLDS Property Laboratory Samples for CY 2013

Radionuclide	Avg. (pCi/g)	No. Samples[b]	No. Samples[c]	Emission Rate[d] (Ci/yr)
U-238[a]	97	836	964	5.5E-07
U-235[a]	5	836	964	2.6E-08
U-234[a]	96	836	964	5.4E-07
Ra-226[a]	22	836	964	1.3E-07
Th-232[a]	4	836	964	2.1E-08
Th-230[a]	30	836	964	1.7E-07
Th-228[a]	4	836	964	2.1E-08
Ra-224[e]	4	836	964	2.1E-08
Th-234[e]	97	836	964	5.5E-07
Pa-234m[e]	97	836	964	5.5E-07
Th-231[e]	5	836	964	2.6E-08
Ra-228[e]	4	836	964	2.1E-08
Ac-228[e]	4	836	964	2.1E-08
Pa-231[e]	5	836	964	2.6E-08
Ac-227[e]	5	836	964	2.6E-08

[a] Average soil concentration from Table A1-1 of the *St. Louis Downtown Site Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013* (SLDS EMDAR CY 2013), Appendix A, Attachment A-1 (USACE 2014a).
[b] Number of samples involved in drying/grinding operations.
[c] Number of samples involved in separations operations.
[d] Emission Rate = (0.001 * Avg * No. Samples [drying and grinding] + 0.005 * Avg * No. Samples [separations]) * (1,000 g * 1E-12Ci/pCi).
[e] Note: When data were not available, the radionuclide was assumed to be in secular equilibrium with the parent.

Table A1-8. SLAPS and SLAPS VPs Laboratory Samples for CY 2013

Radionuclide	Avg. (pCi/g)	No. Samples[b]	No. Samples[c]	Emission Rate[d] (Ci/yr)
U-238[a]	3	3,266	3,289	6.6E-08
U-235[a]	0.4	3,266	3,289	8.7E-09
U-234[a]	3	3,266	3,289	6.6E-08
Ra-226[a]	2	3,266	3,289	3.3E-08
Th-232[a]	1	3,266	3,289	1.7E-08
Th-230[a]	55	3,266	3,289	1.1E-06
Th-228[a]	1	3,266	3,289	1.5E-08
Ra-224[e]	1	3,266	3,289	1.5E-08
Th-234[e]	3	3,266	3,289	6.6E-08
Pa-234m[e]	3	3,266	3,289	6.6E-08
Th-231[e]	0.4	3,266	3,289	8.7E-09
Ra-228[e]	1	3,266	3,289	9.9E-09
Ac-228[e]	1	3,266	3,289	9.9E-09
Pa-231[a]	3	3,266	3,289	6.0E-08
Ac-227[a]	3	3,266	3,289	5.3E-08

[a] Average soil concentration from Table A1-1.
[b] Number of samples involved in drying/grinding operations.
[c] Number of samples involved in separations operations.
[d] Emission Rate = (0.001 * Avg * No. Samples [drying and grinding] + 0.005 * Avg * No. Samples [separations]) * (1,000 g * 1E-12Ci/pCi).
[e] Note: When data were not available, the radionuclide was assumed to be in secular equilibrium with the parent.

Table A1-9. Latty Avenue Property Laboratory Samples for CY 2013

Radionuclide	Avg. (pCi/g)[a]	No. Samples[b]	No. Samples[c]	Emission Rate[d] (Ci/yr)
U-238	18	106	133	1.4E-08
U-235	1	106	133	7.3E-10
U-234	17	106	133	1.3E-08
Ra-226	13	106	133	1.0E-08
Th-232	2	106	133	1.5E-09
Th-230	93	106	133	7.2E-08
Th-228	1	106	133	8.1E-10
Ra-224	1	106	133	8.1E-10
Th-234	18	106	133	1.4E-08
Pa-234m	18	106	133	1.4E-08
Th-231	1	106	133	7.3E-10
Ra-228	0.6	106	133	4.8E-10
Ac-228	0.6	106	133	4.8E-10
Pa-231	13	106	133	1.0E-08
Ac-227	11	106	133	8.6E-09

[a] Average soil concentration from Table A1-1 of the *North St. Louis County Sites Annual Environmental Monitoring Data and Analysis Report for Calendar Year 2013* (NC Sites EMDAR CY 2013), Appendix A, Attachment A-1 (USACE 2014b).
[b] Number of samples involved in drying/grinding operations.
[c] Number of samples involved in separations operations.
[d] Emission Rate = (0.001 * Avg * No. Samples [drying and grinding] + 0.005 * Avg * No. Samples [separations]) * (1,000 g * 1E-12Ci/pCi).

Table A1-10. Iowa Army Ammunition Plant Laboratory Samples for CY 2013

Radionuclide	Avg. (pCi/g)[a]	No. Samples[b]	No. Samples[c]	Emission Rate[d] (Ci/yr)
U-238	95	496	488	2.8E-07
U-235	1	496	488	4.3E-09
U-234	8	496	488	2.5E-08
Ra-226	1	496	488	2.1E-09
Th-232	7	496	488	2.0E-08
Th-230	18	496	488	5.3E-08
Th-228	0.4	496	488	1.2E-09
Ra-224	0.4	496	488	1.2E-09
Th-234	95	496	488	2.8E-07
Pa-234m	95	496	488	2.8E-07
Th-231	1	496	488	4.3E-09
Ra-228	0.4	496	488	1.1E-09
Ac-228	0.4	496	488	1.1E-09
Pa-231	1	496	488	4.3E-09
Ac-227	1	496	488	4.3E-09

[a] Average soil concentration from Table A1-1 of the NC Sites EMDAR CY 2013, Appendix A, Attachment A-1 (USACE 2014b).
[b] Number of samples involved in drying/grinding operations.
[c] Number of samples involved in separations operations.
[d] Emission Rate = (0.001 * Avg * No. Samples [drying and grinding]+ 0.005 * Avg * No. Samples [separations]) * (1,000 g * 1E-12Ci/pCi).

Table A1-11. Total Laboratory Airborne Radioactive Particulate Emission Rate for CY 2013

Radionuclides	Emission Rate (Ci/yr)				
	SLDS	SLAPS/ SLAPS VPs	Latty Avenue Properties	IAAAP Property	Total Across Lab[a]
U-238	5.5E-07	6.6E-08	1.4E-08	2.8E-07	9.1E-07
U-235	2.6E-08	8.7E-09	7.3E-10	4.3E-09	4.0E-08
U-234	5.4E-07	6.6E-08	1.3E-08	2.5E-08	6.5E-07
Ra-226	1.3E-07	3.3E-08	1.0E-08	2.1E-09	1.7E-07
Th-232	2.1E-08	1.7E-08	1.5E-09	2.0E-08	6.0E-08
Th-230	1.7E-07	1.1E-06	7.2E-08	5.3E-08	1.4E-06
Th-228	2.1E-08	1.5E-08	8.1E-10	1.2E-09	3.9E-08
Ra-224	2.1E-08	1.5E-08	8.1E-10	1.2E-09	3.9E-08
Th-234	5.5E-07	6.6E-08	1.4E-08	2.8E-07	9.1E-07
Pa-234m	5.5E-07	6.6E-08	1.4E-08	2.8E-07	9.1E-07
Th-231	2.6E-08	8.7E-09	7.3E-10	4.3E-09	4.0E-08
Ra-228	2.1E-08	9.9E-09	4.8E-10	1.1E-09	3.3E-08
Ac-228	2.1E-08	9.9E-09	4.8E-10	1.1E-09	3.3E-08
Pa-231	2.6E-08	6.0E-08	1.0E-08	4.3E-09	1.0E-07
Ac-227	2.6E-08	5.3E-08	8.6E-09	4.3E-09	9.2E-08

[a] Total emission rate is the sum of the SLDS, SLAPS and SLAPS VPs, Latty Avenue Properties, and IAAAP emission rates.

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ATTACHMENT A-2

CAP88-PC RUNS FOR NORTH ST. LOUIS COUNTY SITES PROPERTIES

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CAP88-PC RUNS FOR THE SLAPS AND SLAPS VICINITY PROPERTIES

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CAP88 OUTPUT RESULTS

Ballfields

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

Non-Radon Individual Assessment
Mar 19, 2014 11:48 am

Facility: IA-09 Ballfields
Address: SLAPS
City: Berkeley
State: MO   Zip: 63134

Source Category: Area
Source Type: Area
Emission Year: 2013

Comments: Air
Air

Dataset Name: IA9BF2013
Dataset Date: 3/19/2014 11:48:00 AM
Wind File: C:\Program Files (x86)\CAP88-PC30\WindLib\13994.WND

Mar 19, 2014 11:48 am

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	5.62E-04
B Surfac	1.76E-01
Breasts	5.84E-04
St Wall	5.71E-04
ULI Wall	6.30E-04
Kidneys	2.75E-03
Lungs	2.38E-02
Ovaries	1.86E-03
R Marrow	7.94E-03
Spleen	5.73E-04
Thymus	5.67E-04
Uterus	5.66E-04
Bld Wall	5.73E-04
Brain	5.69E-04
Esophagu	1.04E-02
SI Wall	5.70E-04
LLI Wall	7.46E-04
Liver	8.11E-03
Muscle	5.89E-04
Pancreas	5.61E-04
Skin	3.64E-03
Testes	1.90E-03
Thyroid	5.78E-04
EFFEC	1.31E-01

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	9.90E-03
INHALATION	1.21E-01
AIR IMMERSION	5.55E-07
GROUND SURFACE	1.76E-04
INTERNAL	1.31E-01
EXTERNAL	1.77E-04
TOTAL	1.31E-01

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SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-238	8.79E-04
Th-234	1.96E-04
Pa-234m	2.75E-05
Pa-234	6.36E-07
U-234	1.07E-03
Th-230	6.70E-02
Ra-226	7.90E-04
Rn-222	1.16E-14
Po-218	6.20E-11
Pb-214	1.72E-06
Bi-214	1.03E-05
Po-214	5.67E-10
Pb-210	9.35E-11
Bi-210	1.39E-09
Po-210	8.71E-14
At-218	0.00E+00
U-235	1.24E-04
Th-231	7.85E-07
Pa-231	2.52E-02
Ac-227	1.73E-02
Th-227	1.37E-06
Ra-223	8.30E-07
Rn-219	0.00E+00
Po-215	1.15E-09
Pb-211	6.50E-07
Bi-211	3.02E-07
Tl-207	3.80E-07
Po-211	1.39E-10
Fr-223	2.02E-08
Th-232	1.89E-03
Ra-228	1.31E-02
Ac-228	1.45E-04
Th-228	2.74E-03
Ra-224	2.05E-04
Rn-220	4.99E-12
Po-216	1.82E-10
Pb-212	1.60E-06
Bi-212	2.52E-06
Po-212	0.00E+00
Tl-208	1.19E-05
TOTAL	1.31E-01

Mar 19, 2014 11:48 am **SUMMARY**
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	7.76E-11
Stomach	2.39E-10
Colon	8.97E-10
Liver	2.02E-09
LUNG	4.42E-08
Bone	2.44E-09
Skin	9.03E-12
Breast	1.33E-10
Ovary	3.49E-10
Bladder	1.79E-10
Kidneys	2.34E-10
Thyroid	1.77E-11
Leukemia	4.80E-10
Residual	8.67E-10
Total	5.21E-08
TOTAL	1.04E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.04E-09
INHALATION	4.90E-08
AIR IMMERSION	2.86E-13
GROUND SURFACE	8.32E-11
INTERNAL	5.20E-08
EXTERNAL	8.35E-11
TOTAL	5.21E-08

Mar 19, 2014 11:48 am **SUMMARY**
Page 4

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	7.14E-10
Th-234	2.17E-10
Pa-234m	4.41E-12
Pa-234	3.47E-13
U-234	8.68E-10
Th-230	3.36E-08
Ra-226	5.27E-10
Rn-222	6.32E-21
Po-218	3.40E-17
Pb-214	9.18E-13
Bi-214	5.48E-12
Po-214	3.11E-16
Pb-210	4.14E-17
Bi-210	1.55E-16
Po-210	4.78E-20
At-218	0.00E+00
U-235	1.00E-10
Th-231	7.42E-13
Pa-231	2.38E-09
Ac-227	4.55E-09
Th-227	9.07E-13
Ra-223	4.49E-13
Rn-219	0.00E+00
Po-215	6.32E-16
Pb-211	2.16E-13
Bi-211	1.65E-13
Tl-207	4.85E-14
Po-211	7.63E-17
Fr-223	1.13E-14
Th-232	8.25E-10
Ra-228	5.71E-09
Ac-228	8.04E-11
Th-228	2.34E-09
Ra-224	1.76E-10
Rn-220	2.73E-18
Po-216	9.95E-17
Pb-212	9.00E-13
Bi-212	1.13E-12
Po-212	0.00E+00
Tl-208	6.52E-12
TOTAL	5.21E-08

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SUMMARY
Page 5

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	490	775	1485	2265	
N	1.3E-01	5.9E-02	2.4E-02	1.5E-02	
NNW	7.1E-02	3.4E-02	1.6E-02	1.2E-02	
NW	8.2E-02	3.9E-02	1.7E-02	1.2E-02	
WNW	9.8E-02	4.5E-02	1.9E-02	1.3E-02	
W	7.6E-02	3.6E-02	1.6E-02	1.2E-02	
WSW	4.0E-02	2.1E-02	1.2E-02	9.5E-03	Business
SW	5.4E-02	2.7E-02	1.3E-02	1.0E-02	
SSW	6.5E-02	3.1E-02	1.5E-02	1.1E-02	
S	5.8E-02	2.9E-02	1.4E-02	1.1E-02	
SSE	4.3E-02	2.2E-02	1.2E-02	9.7E-03	
SE	5.9E-02	2.9E-02	1.4E-02	1.1E-02	
ESE	9.5E-02	4.4E-02	1.9E-02	1.3E-02	
E	1.2E-01	5.5E-02	2.2E-02	1.5E-02	School
ENE	1.0E-01	4.7E-02	2.0E-02	1.3E-02	
NE	6.5E-02	3.2E-02	1.5E-02	1.1E-02	Residence / Farm
NNE	5.6E-02	2.8E-02	1.4E-02	1.1E-02	

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SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	490	775	1485	2265
N	5.2E-08	2.3E-08	8.9E-09	5.5E-09
NNW	2.8E-08	1.3E-08	5.7E-09	4.0E-09
NW	3.2E-08	1.5E-08	6.2E-09	4.2E-09
WNW	3.9E-08	1.8E-08	7.1E-09	4.6E-09
W	3.0E-08	1.4E-08	5.9E-09	4.1E-09
WSW	1.6E-08	7.8E-09	4.0E-09	3.1E-09
SW	2.1E-08	1.0E-08	4.7E-09	3.5E-09
SSW	2.5E-08	1.2E-08	5.3E-09	3.8E-09
S	2.3E-08	1.1E-08	5.0E-09	3.6E-09
SSE	1.7E-08	8.3E-09	4.2E-09	3.2E-09
SE	2.3E-08	1.1E-08	5.1E-09	3.7E-09
ESE	3.8E-08	1.7E-08	7.0E-09	4.6E-09
E	4.9E-08	2.2E-08	8.3E-09	5.2E-09
ENE	4.1E-08	1.8E-08	7.3E-09	4.7E-09
NE	2.6E-08	1.2E-08	5.4E-09	3.8E-09
NNE	2.2E-08	1.1E-08	4.9E-09	3.6E-09

CAP88 OUTPUT RESULTS

VP-16

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 19, 2014 11:55 am

```
Facility:  VP-16
 Address:  SLAPS
    City:  Berkeley
   State:  MO          Zip:    63134

Source Category:  Area
    Source Type:  Area
  Emission Year:  2013

Comments:  Air
           Air

   Dataset Name:  VP162013
   Dataset Date:  3/19/2014 11:54:00 AM
      Wind File:  .   C:\Program Files (x86)\CAP88-
PC30\WindLib\13994.WND
```

Mar 19, 2014 11:55 am **SUMMARY**
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	6.44E-07
B Surfac	3.57E-04
Breasts	6.66E-07
St Wall	6.54E-07
ULI Wall	7.20E-07
Kidneys	5.63E-06
Lungs	7.73E-05
Ovaries	3.18E-06
R Marrow	1.39E-05
Spleen	6.54E-07
Thymus	6.49E-07
Uterus	6.47E-07
Bld Wall	6.53E-07
Brain	6.50E-07
Esophagu	3.55E-05
SI Wall	6.55E-07
LLI Wall	8.56E-07
Liver	8.04E-06
Muscle	6.69E-07
Pancreas	6.42E-07
Skin	1.06E-05
Testes	3.25E-06
Thyroid	6.59E-07
EFFEC	3.17E-04

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.43E-05
INHALATION	3.02E-04
AIR IMMERSION	7.78E-10
GROUND SURFACE	2.21E-07
INTERNAL	3.17E-04
EXTERNAL	2.22E-07
TOTAL	3.17E-04

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Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-238	6.86E-07
Th-234	7.78E-07
Pa-234m	1.09E-07
Pa-234	0.00E+00
U-234	8.33E-07
Th-230	2.78E-04
Ra-226	6.57E-07
Rn-222	0.00E+00
Po-218	4.82E-14
Pb-214	1.34E-09
Bi-214	8.03E-09
Po-214	4.41E-13
Pb-210	0.00E+00
Bi-210	0.00E+00
Po-210	0.00E+00
At-218	0.00E+00
U-235	0.00E+00
Th-231	1.03E-09
Pa-231	1.46E-05
Ac-227	9.44E-06
Th-227	3.95E-10
Ra-223	2.17E-10
Rn-219	0.00E+00
Po-215	3.02E-13
Pb-211	1.70E-10
Bi-211	7.90E-11
Tl-207	9.95E-11
Po-211	0.00E+00
Fr-223	0.00E+00
Th-232	4.78E-07
Ra-228	9.85E-06
Ac-228	1.16E-07
Th-228	7.68E-07
Ra-224	5.74E-08
Rn-220	1.39E-15
Po-216	1.18E-13
Pb-212	9.83E-10
Bi-212	1.64E-09
Po-212	0.00E+00
Tl-208	0.00E+00
TOTAL	3.17E-04

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Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	8.51E-14
Stomach	2.41E-13
Colon	1.31E-12
Liver	1.80E-12
LUNG	1.42E-10
Bone	4.10E-12
Skin	1.61E-14
Breast	1.31E-13
Ovary	5.48E-13
Bladder	1.99E-13
Kidneys	4.04E-13
Thyroid	1.78E-14
Leukemia	6.70E-13
Residual	8.38E-13
Total	1.52E-10
TOTAL	3.04E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.13E-12
INHALATION	1.49E-10
AIR IMMERSION	3.55E-16
GROUND SURFACE	7.68E-14
INTERNAL	1.52E-10
EXTERNAL	7.72E-14
TOTAL	1.52E-10

Mar 19, 2014 11:55 am SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	5.59E-13
Th-234	8.51E-13
Pa-234m	1.75E-14
Pa-234	0.00E+00
U-234	6.80E-13
Th-230	1.40E-10
Ra-226	4.49E-13
Rn-222	0.00E+00
Po-218	2.64E-20
Pb-214	7.14E-16
Bi-214	4.27E-15
Po-214	2.42E-19
Pb-210	0.00E+00
Bi-210	0.00E+00
Po-210	0.00E+00
At-218	0.00E+00
U-235	0.00E+00
Th-231	9.95E-16
Pa-231	1.38E-12
Ac-227	2.48E-12
Th-227	2.13E-16
Ra-223	1.18E-16
Rn-219	0.00E+00
Po-215	1.65E-19
Pb-211	5.66E-17
Bi-211	4.33E-17
Tl-207	1.27E-17
Po-211	0.00E+00
Fr-223	0.00E+00
Th-232	2.12E-13
Ra-228	4.33E-12
Ac-228	6.42E-14
Th-228	6.56E-13
Ra-224	4.94E-14
Rn-220	7.61E-22
Po-216	6.48E-20
Pb-212	5.35E-16
Bi-212	7.35E-16
Po-212	0.00E+00
Tl-208	0.00E+00
TOTAL	1.52E-10

Mar 19, 2014 11:55 am

SUMMARY
Page 5

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	425	1060	1425	1915	
N	3.2E-04	6.5E-05	4.3E-05	3.0E-05	Residence
NNW	1.7E-04	3.8E-05	2.7E-05	2.0E-05	
NW	1.9E-04	4.3E-05	3.0E-05	2.2E-05	
WNW	2.4E-04	5.0E-05	3.4E-05	2.5E-05	
W	1.8E-04	4.0E-05	2.8E-05	2.1E-05	Business / School
WSW	9.1E-05	2.4E-05	1.9E-05	1.5E-05	
SW	1.3E-04	3.0E-05	2.2E-05	1.7E-05	
SSW	1.5E-04	3.5E-05	2.5E-05	1.9E-05	
S	1.4E-04	3.3E-05	2.4E-05	1.8E-05	
SSE	9.8E-05	2.6E-05	2.0E-05	1.6E-05	
SE	1.4E-04	3.3E-05	2.4E-05	1.8E-05	
ESE	2.3E-04	4.9E-05	3.4E-05	2.4E-05	
E	3.0E-04	6.0E-05	4.0E-05	2.8E-05	
ENE	2.5E-04	5.2E-05	3.5E-05	2.5E-05	
NE	1.5E-04	3.6E-05	2.6E-05	1.9E-05	
NNE	1.3E-04	3.2E-05	2.3E-05	1.8E-05	Farm

Mar 19, 2014 11:55 am

SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	425	1060	1425	1915
N	1.5E-10	2.9E-11	1.8E-11	1.2E-11
NNW	7.9E-11	1.6E-11	1.1E-11	7.3E-12
NW	9.3E-11	1.8E-11	1.2E-11	8.1E-12
WNW	1.1E-10	2.2E-11	1.4E-11	9.3E-12
W	8.5E-11	1.7E-11	1.1E-11	7.6E-12
WSW	4.2E-11	9.3E-12	6.5E-12	4.8E-12
SW	5.9E-11	1.2E-11	8.2E-12	5.8E-12
SSW	7.2E-11	1.4E-11	9.6E-12	6.7E-12
S	6.3E-11	1.3E-11	8.9E-12	6.2E-12
SSE	4.5E-11	9.9E-12	6.9E-12	5.0E-12
SE	6.4E-11	1.3E-11	9.0E-12	6.3E-12
ESE	1.1E-10	2.1E-11	1.4E-11	9.2E-12
E	1.4E-10	2.7E-11	1.7E-11	1.1E-11
ENE	1.2E-10	2.3E-11	1.4E-11	9.6E-12
NE	7.3E-11	1.5E-11	9.8E-12	6.8E-12
NNE	6.1E-11	1.3E-11	8.6E-12	6.1E-12

CAP88 OUTPUT RESULTS

SLAPS Loadout

```
                         C A P 8 8 - P C

                          Version 3.0

             Clean Air Act Assessment Package - 1988


     D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

                  Non-Radon Individual Assessment
                       Mar  19, 2014  12:10 pm


          Facility:  SLAPS Loadout
           Address:  SLAPS
              City:  Berkeley
             State:  MO         Zip:    63134


          Source Category:  Area
              Source Type:  Area
            Emission Year:  2013


          Comments:  Air
                     Air


             Dataset Name:  SLAPLO2013
             Dataset Date:  3/19/2014 12:09:00 PM
                Wind File:  .   C:\Program Files (x86)\CAP88-
PC30\WindLib\13994.WND
```

Mar 19, 2014 12:10 pm

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	2.92E-04
B Surfac	8.45E-02
Breasts	3.06E-04
St Wall	2.98E-04
ULI Wall	3.27E-04
Kidneys	1.36E-03
Lungs	1.13E-02
Ovaries	9.03E-04
R Marrow	3.96E-03
Spleen	2.99E-04
Thymus	2.96E-04
Uterus	2.95E-04
Bld Wall	2.99E-04
Brain	2.97E-04
Esophagu	4.97E-03
SI Wall	2.97E-04
LLI Wall	3.84E-04
Liver	3.81E-03
Muscle	3.09E-04
Pancreas	2.92E-04
Skin	2.18E-03
Testes	9.26E-04
Thyroid	3.03E-04
EFFEC	6.28E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	5.63E-03
INHALATION	5.71E-02
AIR IMMERSION	3.48E-07
GROUND SURFACE	1.07E-04
INTERNAL	6.27E-02
EXTERNAL	1.07E-04
TOTAL	6.28E-02

Mar 19, 2014 12:10 pm

SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-238	3.95E-04
Th-234	1.22E-04
Pa-234m	1.69E-05
Pa-234	3.87E-07
U-234	4.79E-04
Th-230	3.15E-02
Ra-226	3.59E-04
Rn-222	5.30E-15
Po-218	2.83E-11
Pb-214	7.85E-07
Bi-214	4.71E-06
Po-214	2.59E-10
Pb-210	4.27E-11
Bi-210	6.37E-10
Po-210	3.98E-14
At-218	0.00E+00
U-235	5.79E-05
Th-231	4.88E-07
Pa-231	1.17E-02
Ac-227	7.65E-03
Th-227	6.03E-07
Ra-223	3.67E-07
Rn-219	0.00E+00
Po-215	5.09E-10
Pb-211	2.87E-07
Bi-211	1.33E-07
Tl-207	1.68E-07
Po-211	6.14E-11
Fr-223	8.93E-09
Th-232	8.63E-04
Ra-228	8.20E-03
Ac-228	9.14E-05
Th-228	1.24E-03
Ra-224	9.29E-05
Rn-220	2.27E-12
Po-216	1.06E-10
Pb-212	9.19E-07
Bi-212	1.46E-06
Po-212	0.00E+00
Tl-208	6.94E-06
TOTAL	6.28E-02

Mar 19, 2014 12:10 pm **SUMMARY**
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	4.11E-11
Stomach	1.33E-10
Colon	5.07E-10
Liver	9.82E-10
LUNG	2.11E-08
Bone	1.25E-09
Skin	5.13E-12
Breast	7.40E-11
Ovary	1.74E-10
Bladder	9.42E-11
Kidneys	1.22E-10
Thyroid	9.74E-12
Leukemia	2.57E-10
Residual	4.82E-10
Total	2.52E-08
TOTAL	5.05E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.83E-09
INHALATION	2.34E-08
AIR IMMERSION	1.79E-13
GROUND SURFACE	5.05E-11
INTERNAL	2.52E-08
EXTERNAL	5.07E-11
TOTAL	2.52E-08

Mar 19, 2014 12:10 pm

SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	3.21E-10
Th-234	1.35E-10
Pa-234m	2.72E-12
Pa-234	2.11E-13
U-234	3.90E-10
Th-230	1.58E-08
Ra-226	2.40E-10
Rn-222	2.88E-21
Po-218	1.55E-17
Pb-214	4.19E-13
Bi-214	2.50E-12
Po-214	1.42E-16
Pb-210	1.89E-17
Bi-210	7.06E-17
Po-210	2.18E-20
At-218	0.00E+00
U-235	4.70E-11
Th-231	4.63E-13
Pa-231	1.10E-09
Ac-227	2.01E-09
Th-227	4.00E-13
Ra-223	1.99E-13
Rn-219	0.00E+00
Po-215	2.79E-16
Pb-211	9.54E-14
Bi-211	7.30E-14
Tl-207	2.14E-14
Po-211	3.37E-17
Fr-223	5.01E-15
Th-232	3.76E-10
Ra-228	3.58E-09
Ac-228	5.07E-11
Th-228	1.06E-09
Ra-224	7.99E-11
Rn-220	1.24E-18
Po-216	5.79E-17
Pb-212	5.13E-13
Bi-212	6.57E-13
Po-212	0.00E+00
Tl-208	3.79E-12
TOTAL	2.52E-08

Mar 19, 2014 12:10 pm SUMMARY
Page 5

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	500	770	1710	2580	
N	6.3E-02	3.0E-02	1.1E-02	7.4E-03	
NNW	3.4E-02	1.8E-02	7.5E-03	5.9E-03	
NW	4.0E-02	2.0E-02	8.0E-03	6.1E-03	
WNW	4.7E-02	2.3E-02	8.8E-03	6.5E-03	
W	3.7E-02	1.8E-02	7.7E-03	6.0E-03	
WSW	2.0E-02	1.1E-02	5.9E-03	5.1E-03	Business
SW	2.6E-02	1.4E-02	6.6E-03	5.4E-03	
SSW	3.1E-02	1.6E-02	7.1E-03	5.7E-03	
S	2.8E-02	1.5E-02	6.8E-03	5.5E-03	
SSE	2.1E-02	1.2E-02	6.1E-03	5.2E-03	
SE	2.9E-02	1.5E-02	6.9E-03	5.6E-03	
ESE	4.6E-02	2.3E-02	8.7E-03	6.5E-03	
E	5.9E-02	2.8E-02	1.0E-02	7.1E-03	School
ENE	4.9E-02	2.4E-02	9.0E-03	6.6E-03	
NE	3.2E-02	1.6E-02	7.2E-03	5.7E-03	Residence / Farm
NNE	2.7E-02	1.4E-02	6.7E-03	5.5E-03	

Mar 19, 2014 12:10 pm

SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	500	770	1710	2580
N	2.5E-08	1.2E-08	4.0E-09	2.7E-09
NNW	1.4E-08	6.8E-09	2.7E-09	2.1E-09
NW	1.6E-08	7.7E-09	2.9E-09	2.2E-09
WNW	1.9E-08	9.1E-09	3.3E-09	2.3E-09
W	1.5E-08	7.2E-09	2.8E-09	2.1E-09
WSW	7.7E-09	4.2E-09	2.1E-09	1.7E-09
SW	1.0E-08	5.3E-09	2.3E-09	1.9E-09
SSW	1.2E-08	6.2E-09	2.6E-09	2.0E-09
S	1.1E-08	5.7E-09	2.4E-09	1.9E-09
SSE	8.2E-09	4.4E-09	2.1E-09	1.8E-09
SE	1.1E-08	5.8E-09	2.5E-09	1.9E-09
ESE	1.8E-08	8.9E-09	3.2E-09	2.3E-09
E	2.4E-08	1.1E-08	3.7E-09	2.5E-09
ENE	2.0E-08	9.4E-09	3.3E-09	2.3E-09
NE	1.3E-08	6.3E-09	2.6E-09	2.0E-09
NNE	1.1E-08	5.5E-09	2.4E-09	1.9E-09

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CAP88-PC RUNS FOR THE USACE LAB

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CAP88 OUTPUT RESULTS

USACE Laboratory

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

Non-Radon Individual Assessment
Apr 14, 2014 11:07 am

```
      Facility:  HISS LAB
       Address:  Latty
          City:  Berkeley
         State:  MO          Zip:    63134

      Source Category:  Area
          Source Type:  Stack
        Emission Year:  2013

      Comments:  Air
                 Air

         Dataset Name:  HISS LAB 2013
         Dataset Date:  4/14/2014 11:07:00 AM
            Wind File:      C:\Program Files (x86)\CAP88-
PC30\WindLib\13994.WND
```

Apr 14, 2014 11:07 am

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	1.44E-05
B Surfac	5.20E-03
Breasts	1.47E-05
St Wall	1.46E-05
ULI Wall	1.65E-05
Kidneys	8.58E-05
Lungs	8.79E-04
Ovaries	5.47E-05
R Marrow	2.10E-04
Spleen	1.47E-05
Thymus	1.45E-05
Uterus	1.45E-05
Bld Wall	1.46E-05
Brain	1.45E-05
Esophagu	3.37E-04
SI Wall	1.46E-05
LLI Wall	2.02E-05
Liver	2.59E-04
Muscle	1.48E-05
Pancreas	1.45E-05
Skin	6.14E-05
Testes	5.54E-05
Thyroid	1.46E-05
EFFEC	4.26E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.29E-04
INHALATION	4.13E-03
AIR IMMERSION	1.23E-09
GROUND SURFACE	2.21E-06
INTERNAL	4.26E-03
EXTERNAL	2.21E-06
TOTAL	4.26E-03

Apr 14, 2014 11:07 am

SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-238	2.51E-04
Th-234	9.60E-07
Pa-234m	4.24E-07
Pa-234	0.00E+00
U-234	2.17E-04
Th-230	1.88E-03
Ra-226	7.99E-05
Rn-222	0.00E+00
Po-218	6.30E-12
Pb-214	1.75E-07
Bi-214	1.05E-06
Po-214	5.77E-11
Pb-210	0.00E+00
Bi-210	0.00E+00
Po-210	0.00E+00
At-218	0.00E+00
U-235	1.19E-05
Th-231	3.94E-09
Pa-231	8.81E-04
Ac-227	6.29E-04
Th-227	2.93E-08
Ra-223	2.80E-08
Rn-219	0.00E+00
Po-215	3.89E-11
Pb-211	2.20E-08
Bi-211	1.02E-08
Tl-207	1.28E-08
Po-211	0.00E+00
Fr-223	0.00E+00
Th-232	1.41E-04
Ra-228	1.45E-05
Ac-228	1.73E-07
Th-228	1.44E-04
Ra-224	1.08E-05
Rn-220	2.45E-13
Po-216	2.69E-12
Pb-212	2.25E-08
Bi-212	3.75E-08
Po-212	0.00E+00
Tl-208	1.75E-07
TOTAL	4.26E-03

Apr 14, 2014 11:07 am SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	1.77E-12
Stomach	4.06E-12
Colon	1.51E-11
Liver	5.77E-11
LUNG	1.66E-09
Bone	5.74E-11
Skin	1.63E-13
Breast	2.29E-12
Ovary	9.16E-12
Bladder	4.22E-12
Kidneys	6.37E-12
Thyroid	3.24E-13
Leukemia	9.52E-12
Residual	1.61E-11
Total	1.84E-09
TOTAL	3.69E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.57E-11
INHALATION	1.82E-09
AIR IMMERSION	5.85E-16
GROUND SURFACE	1.01E-12
INTERNAL	1.84E-09
EXTERNAL	1.01E-12
TOTAL	1.84E-09

Apr 14, 2014 11:07 am **SUMMARY Page 4**

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	2.04E-10
Th-234	1.03E-12
Pa-234m	6.80E-14
Pa-234	0.00E+00
U-234	1.78E-10
Th-230	9.47E-10
Ra-226	5.49E-11
Rn-222	0.00E+00
Po-218	3.46E-18
Pb-214	9.34E-14
Bi-214	5.58E-13
Po-214	3.17E-17
Pb-210	0.00E+00
Bi-210	0.00E+00
Po-210	0.00E+00
At-218	0.00E+00
U-235	9.72E-12
Th-231	2.42E-15
Pa-231	8.32E-11
Ac-227	1.65E-10
Th-227	1.58E-14
Ra-223	1.52E-14
Rn-219	0.00E+00
Po-215	2.13E-17
Pb-211	7.29E-15
Bi-211	5.58E-15
Tl-207	1.64E-15
Po-211	0.00E+00
Fr-223	0.00E+00
Th-232	6.16E-11
Ra-228	6.38E-12
Ac-228	9.60E-14
Th-228	1.23E-10
Ra-224	9.29E-12
Rn-220	1.34E-19
Po-216	1.48E-18
Pb-212	1.22E-14
Bi-212	1.68E-14
Po-212	0.00E+00
Tl-208	9.56E-14
TOTAL	1.84E-09

Apr 14, 2014 11:07 am **SUMMARY**
Page 5

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)				
Direction	110	310	330	1830	
N	4.3E-03	1.1E-03	9.6E-04	1.3E-04	
NNW	2.4E-03	5.9E-04	5.4E-04	1.1E-04	
NW	2.4E-03	6.7E-04	6.1E-04	1.2E-04	
WNW	2.8E-03	8.0E-04	7.3E-04	1.2E-04	
W	2.3E-03	6.3E-04	5.7E-04	1.1E-04	
WSW	1.2E-03	3.5E-04	3.2E-04	1.0E-04	
SW	1.5E-03	4.5E-04	4.2E-04	1.1E-04	
SSW	1.7E-03	5.4E-04	5.0E-04	1.1E-04	
S	1.9E-03	4.9E-04	4.5E-04	1.1E-04	Business
SSE	1.4E-03	3.7E-04	3.4E-04	1.0E-04	
SE	1.9E-03	5.0E-04	4.6E-04	1.1E-04	School
ESE	2.9E-03	7.8E-04	7.1E-04	1.2E-04	
E	3.4E-03	9.9E-04	9.0E-04	1.3E-04	
ENE	2.7E-03	8.3E-04	7.6E-04	1.2E-04	
NE	1.9E-03	5.5E-04	5.0E-04	1.1E-04	Farm / Residence
NNE	1.7E-03	4.8E-04	4.4E-04	1.1E-04	

Apr 14, 2014 11:07 am

SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	110	310	330	1830
N	1.8E-09	4.4E-10	4.0E-10	3.7E-11
NNW	1.0E-09	2.4E-10	2.1E-10	2.8E-11
NW	1.0E-09	2.7E-10	2.5E-10	2.9E-11
WNW	1.2E-09	3.3E-10	3.0E-10	3.2E-11
W	9.7E-10	2.5E-10	2.3E-10	2.8E-11
WSW	4.9E-10	1.3E-10	1.2E-10	2.3E-11
SW	6.2E-10	1.8E-10	1.6E-10	2.5E-11
SSW	7.4E-10	2.1E-10	2.0E-10	2.7E-11
S	8.0E-10	1.9E-10	1.8E-10	2.6E-11
SSE	5.8E-10	1.4E-10	1.3E-10	2.4E-11
SE	8.2E-10	2.0E-10	1.8E-10	2.6E-11
ESE	1.2E-09	3.2E-10	2.9E-10	3.1E-11
E	1.5E-09	4.1E-10	3.7E-10	3.5E-11
ENE	1.2E-09	3.4E-10	3.1E-10	3.2E-11
NE	8.3E-10	2.2E-10	2.0E-10	2.7E-11
NNE	7.3E-10	1.9E-10	1.7E-10	2.6E-11

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APPENDIX B

ENVIRONMENTAL TLD, ALPHA TRACK, AND PERIMETER AIR DATA

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Table B-1. Background Air Particulate Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
HIS141313	BAP-001	01/02/13	Gross Alpha/Beta	Gross Alpha	1.46E-15	7.23E-16	6.04E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS141313	BAP-001	01/02/13	Gross Alpha/Beta	Gross Beta	3.42E-14	2.75E-15	1.62E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151552	BAP-001	01/07/13	Gross Alpha/Beta	Gross Alpha	1.01E-14	1.98E-15	8.5E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151552	BAP-001	01/07/13	Gross Alpha/Beta	Gross Beta	4.04E-14	3.31E-15	1.98E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151553	BAP-001	01/14/13	Gross Alpha/Beta	Gross Alpha	8.41E-15	1.52E-15	5.96E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151553	BAP-001	01/14/13	Gross Alpha/Beta	Gross Beta	3.08E-14	2.4E-15	1.39E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151554	BAP-001	01/22/13	Gross Alpha/Beta	Gross Alpha	2.86E-15	8.5E-16	5.4E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151554	BAP-001	01/22/13	Gross Alpha/Beta	Gross Beta	1.93E-14	1.87E-15	1.26E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151555	BAP-001	01/28/13	Gross Alpha/Beta	Gross Alpha	2.25E-15	8.91E-16	7.14E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151555	BAP-001	01/28/13	Gross Alpha/Beta	Gross Beta	2.85E-14	2.59E-15	1.67E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151556	BAP-001	02/04/13	Gross Alpha/Beta	Gross Alpha	5.08E-15	1.21E-15	6.3E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151556	BAP-001	02/04/13	Gross Alpha/Beta	Gross Beta	2.64E-14	2.33E-15	1.47E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151557	BAP-001	02/11/13	Gross Alpha/Beta	Gross Alpha	3.78E-15	1.02E-15	5.89E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151557	BAP-001	02/11/13	Gross Alpha/Beta	Gross Beta	2.07E-14	2.03E-15	1.38E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151558	BAP-001	02/19/13	Gross Alpha/Beta	Gross Alpha	2.3E-15	7.78E-16	5.5E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151558	BAP-001	02/19/13	Gross Alpha/Beta	Gross Beta	1.81E-14	1.85E-15	1.29E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151559	BAP-001	02/25/13	Gross Alpha/Beta	Gross Alpha	1.55E-15	7.73E-16	7.29E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151559	BAP-001	02/25/13	Gross Alpha/Beta	Gross Beta	1.77E-14	2.19E-15	1.7E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151560	BAP-001	03/04/13	Gross Alpha/Beta	Gross Alpha	1.44E-15	6.79E-16	6.17E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151560	BAP-001	03/04/13	Gross Alpha/Beta	Gross Beta	1.63E-14	1.91E-15	1.44E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151561	BAP-001	03/11/13	Gross Alpha/Beta	Gross Alpha	1.73E-15	7.28E-16	6.09E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151561	BAP-001	03/11/13	Gross Alpha/Beta	Gross Beta	1.29E-14	1.75E-15	1.42E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151562	BAP-001	03/20/13	Gross Alpha/Beta	Gross Alpha	2.95E-15	8.05E-16	4.74E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151562	BAP-001	03/20/13	Gross Alpha/Beta	Gross Beta	2.13E-14	1.8E-15	1.11E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151563	BAP-001	03/26/13	Gross Alpha/Beta	Gross Alpha	7.81E-16	5.93E-16	7.1E-16	µCi/mL	J	T04	HISS Air (Particulate Air)-Environmental Monitoring
HIS151563	BAP-001	03/26/13	Gross Alpha/Beta	Gross Beta	1.32E-14	1.95E-15	1.66E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151564	BAP-001	04/01/13	Gross Alpha/Beta	Gross Alpha	5.34E-15	1.36E-15	6.93E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151564	BAP-001	04/01/13	Gross Alpha/Beta	Gross Beta	1.85E-14	2.16E-15	1.67E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151565	BAP-001	04/08/13	Gross Alpha/Beta	Gross Alpha	4.29E-15	1.12E-15	5.9E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151565	BAP-001	04/08/13	Gross Alpha/Beta	Gross Beta	1.47E-14	1.79E-15	1.42E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151566	BAP-001	04/15/13	Gross Alpha/Beta	Gross Alpha	3.2E-15	9.7E-16	5.78E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151566	BAP-001	04/15/13	Gross Alpha/Beta	Gross Beta	1.24E-14	1.66E-15	1.39E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151567	BAP-001	04/22/13	Gross Alpha/Beta	Gross Alpha	3.24E-15	9.71E-16	5.74E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151567	BAP-001	04/22/13	Gross Alpha/Beta	Gross Beta	1.11E-14	1.59E-15	1.38E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151568	BAP-001	04/29/13	Gross Alpha/Beta	Gross Alpha	4.25E-15	1.1E-15	5.76E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151568	BAP-001	04/29/13	Gross Alpha/Beta	Gross Beta	1.48E-14	1.77E-15	1.39E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151569	BAP-001	05/06/13	Gross Alpha/Beta	Gross Alpha	2.66E-15	8.84E-16	5.68E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151569	BAP-001	05/06/13	Gross Alpha/Beta	Gross Beta	9.03E-15	1.47E-15	1.37E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151570	BAP-001	05/13/13	Gross Alpha/Beta	Gross Alpha	2.06E-15	8.1E-16	5.9E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151570	BAP-001	05/13/13	Gross Alpha/Beta	Gross Beta	1.05E-14	1.59E-15	1.42E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151571	BAP-001	05/20/13	Gross Alpha/Beta	Gross Alpha	4.19E-15	1.11E-15	5.94E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151571	BAP-001	05/20/13	Gross Alpha/Beta	Gross Beta	2.12E-14	2.07E-15	1.43E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring

Table B-1. Background Air Particulate Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
HIS151572	BAP-001	05/28/13	Gross Alpha/Beta	Gross Alpha	1.75E-15	7.15E-16	5.34E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151572	BAP-001	05/28/13	Gross Alpha/Beta	Gross Beta	1.34E-14	1.62E-15	1.28E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151573	BAP-001	06/03/13	Gross Alpha/Beta	Gross Alpha	1.61E-15	7.49E-16	6.11E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151573	BAP-001	06/03/13	Gross Alpha/Beta	Gross Beta	9.34E-15	1.56E-15	1.47E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151574	BAP-001	06/10/13	Gross Alpha/Beta	Gross Alpha	2.28E-15	8.27E-16	5.67E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151574	BAP-001	06/10/13	Gross Alpha/Beta	Gross Beta	1.39E-14	1.71E-15	1.36E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151575	BAP-001	06/18/13	Gross Alpha/Beta	Gross Alpha	2.19E-15	7.69E-16	5.15E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151575	BAP-001	06/18/13	Gross Alpha/Beta	Gross Beta	1.48E-14	1.65E-15	1.24E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151576	BAP-001	06/24/13	Gross Alpha/Beta	Gross Alpha	1.19E-15	7.14E-16	6.75E-16	µCi/mL	J	T04	HISS Air (Particulate Air)-Environmental Monitoring
HIS151576	BAP-001	06/24/13	Gross Alpha/Beta	Gross Beta	2.25E-14	2.29E-15	1.62E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151577	BAP-001	07/01/13	Gross Alpha/Beta	Gross Alpha	4.97E-15	1.17E-15	4.58E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151577	BAP-001	07/01/13	Gross Alpha/Beta	Gross Beta	1.52E-14	1.77E-15	1.46E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151578	BAP-001	07/08/13	Gross Alpha/Beta	Gross Alpha	7.16E-15	1.37E-15	4.28E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151578	BAP-001	07/08/13	Gross Alpha/Beta	Gross Beta	1.6E-14	1.73E-15	1.36E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151579	BAP-001	07/15/13	Gross Alpha/Beta	Gross Alpha	4.08E-15	1.03E-15	4.32E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151579	BAP-001	07/15/13	Gross Alpha/Beta	Gross Beta	1.32E-14	1.62E-15	1.37E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151580	BAP-001	07/22/13	Gross Alpha/Beta	Gross Alpha	2.92E-15	8.98E-16	4.59E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151580	BAP-001	07/22/13	Gross Alpha/Beta	Gross Beta	1.21E-14	1.62E-15	1.46E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151581	BAP-001	07/29/13	Gross Alpha/Beta	Gross Alpha	4.14E-15	1.03E-15	4.26E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151581	BAP-001	07/29/13	Gross Alpha/Beta	Gross Beta	1.13E-14	1.51E-15	1.35E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151582	BAP-001	08/05/13	Gross Alpha/Beta	Gross Alpha	5.64E-15	1.23E-15	4.45E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151582	BAP-001	08/05/13	Gross Alpha/Beta	Gross Beta	2.6E-14	2.18E-15	1.41E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151583	BAP-001	08/12/13	Gross Alpha/Beta	Gross Alpha	5.04E-15	1.16E-15	4.47E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151583	BAP-001	08/12/13	Gross Alpha/Beta	Gross Beta	2.01E-14	1.96E-15	1.42E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151584	BAP-001	08/19/13	Gross Alpha/Beta	Gross Alpha	2.95E-15	8.85E-16	4.44E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151584	BAP-001	08/19/13	Gross Alpha/Beta	Gross Beta	1.89E-14	1.9E-15	1.41E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151585	BAP-001	08/26/13	Gross Alpha/Beta	Gross Alpha	5.05E-15	1.17E-15	4.48E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151585	BAP-001	08/26/13	Gross Alpha/Beta	Gross Beta	3.33E-14	2.44E-15	1.42E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151586	BAP-001	09/03/13	Gross Alpha/Beta	Gross Alpha	3.54E-15	9.26E-16	4.04E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151586	BAP-001	09/03/13	Gross Alpha/Beta	Gross Beta	2.29E-14	1.96E-15	1.28E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151587	BAP-001	09/09/13	Gross Alpha/Beta	Gross Alpha	3.68E-15	1.06E-15	5.1E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151587	BAP-001	09/09/13	Gross Alpha/Beta	Gross Beta	2.69E-14	2.39E-15	1.62E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151588	BAP-001	09/17/13	Gross Alpha/Beta	Gross Alpha	3.33E-15	8.79E-16	3.87E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151588	BAP-001	09/17/13	Gross Alpha/Beta	Gross Beta	2.48E-14	1.97E-15	1.23E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151589	BAP-001	09/23/13	Gross Alpha/Beta	Gross Alpha	1.28E-15	6.3E-16	4.96E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151589	BAP-001	09/23/13	Gross Alpha/Beta	Gross Beta	2.42E-14	2.25E-15	1.58E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151590	BAP-001	09/30/13	Gross Alpha/Beta	Gross Alpha	2.04E-15	7.46E-16	4.5E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151590	BAP-001	09/30/13	Gross Alpha/Beta	Gross Beta	2.44E-14	2.14E-15	1.43E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151591	BAP-001	10/07/13	Gross Alpha/Beta	Gross Alpha	3.74E-15	1.01E-15	4.63E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151591	BAP-001	10/07/13	Gross Alpha/Beta	Gross Beta	1.45E-14	1.75E-15	1.35E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151592	BAP-001	10/14/13	Gross Alpha/Beta	Gross Alpha	6.55E-15	1.45E-15	5.32E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151592	BAP-001	10/14/13	Gross Alpha/Beta	Gross Beta	2.49E-14	2.37E-15	1.55E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring

Table B-1. Background Air Particulate Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
HIS151593	BAP-001	10/21/13	Gross Alpha/Beta	Gross Alpha	6.71E-15	1.4E-15	4.82E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151593	BAP-001	10/21/13	Gross Alpha/Beta	Gross Beta	2.2E-14	2.12E-15	1.41E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151594	BAP-001	10/28/13	Gross Alpha/Beta	Gross Alpha	4.82E-15	1.16E-15	4.67E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151594	BAP-001	10/28/13	Gross Alpha/Beta	Gross Beta	1.61E-14	1.83E-15	1.36E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151595	BAP-001	11/04/13	Gross Alpha/Beta	Gross Alpha	9.13E-15	1.68E-15	4.96E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151595	BAP-001	11/04/13	Gross Alpha/Beta	Gross Beta	3.25E-14	2.56E-15	1.45E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151596	BAP-001	11/11/13	Gross Alpha/Beta	Gross Alpha	4.64E-15	1.13E-15	4.61E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151596	BAP-001	11/11/13	Gross Alpha/Beta	Gross Beta	2.26E-14	2.09E-15	1.35E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151597	BAP-001	11/19/13	Gross Alpha/Beta	Gross Alpha	3.37E-15	8.82E-16	3.91E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151597	BAP-001	11/19/13	Gross Alpha/Beta	Gross Beta	1.72E-14	1.7E-15	1.14E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151598	BAP-001	11/25/13	Gross Alpha/Beta	Gross Alpha	3.24E-15	1.03E-15	5.55E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151598	BAP-001	11/25/13	Gross Alpha/Beta	Gross Beta	2.09E-14	2.26E-15	1.62E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151599	BAP-001	12/02/13	Gross Alpha/Beta	Gross Alpha	5.11E-15	1.18E-15	4.59E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151599	BAP-001	12/02/13	Gross Alpha/Beta	Gross Beta	3.24E-14	2.45E-15	1.34E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151600	BAP-001	12/09/13	Gross Alpha/Beta	Gross Alpha	3.94E-15	1.19E-15	6.06E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151600	BAP-001	12/09/13	Gross Alpha/Beta	Gross Beta	3.45E-14	2.94E-15	1.77E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151601	BAP-001	12/16/13	Gross Alpha/Beta	Gross Alpha	1.96E-15	7.34E-16	4.63E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151601	BAP-001	12/16/13	Gross Alpha/Beta	Gross Beta	3E-14	2.38E-15	1.35E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151602	BAP-001	12/23/13	Gross Alpha/Beta	Gross Alpha	2.39E-15	7.97E-16	4.51E-16	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151602	BAP-001	12/23/13	Gross Alpha/Beta	Gross Beta	2.44E-14	2.14E-15	1.32E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring
HIS151603	BAP-001	12/30/13	Gross Alpha/Beta	Gross Alpha	1E-15	5.63E-16	5.04E-16	µCi/mL	J	T04	HISS Air (Particulate Air)-Environmental Monitoring
HIS151603	BAP-001	12/30/13	Gross Alpha/Beta	Gross Beta	2.62E-14	2.35E-15	1.47E-15	µCi/mL	=		HISS Air (Particulate Air)-Environmental Monitoring

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA150782	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Alpha	7.29E-16	5.886E-15	1.237E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150782	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Beta	5.42E-15	1.343E-14	1.936E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150783	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Beta	8.618E-14	2.056E-14	1.881E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150783	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Alpha	1.163E-14	9.265E-15	1.202E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150784	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Beta	6.253E-14	1.906E-14	1.936E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150784	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Alpha	5.727E-15	7.723E-15	1.237E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150785	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Beta	1.006E-13	2.206E-14	1.936E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150785	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Alpha	1.073E-14	9.203E-15	1.237E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150786	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Alpha	-4.269E-15	3.11E-15	1.237E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150786	SLAPS Loadout	01/02/13	Gross Alpha/Beta	Gross Beta	4.627E-15	1.333E-14	1.936E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150787	SLAPS Loadout	01/03/13	Gross Alpha/Beta	Gross Beta	3.958E-14	1.627E-14	1.829E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150787	SLAPS Loadout	01/03/13	Gross Alpha/Beta	Gross Alpha	4.229E-15	6.901E-15	1.169E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150788	SLAPS Loadout	01/03/13	Gross Alpha/Beta	Gross Beta	3.434E-14	1.578E-14	1.829E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150788	SLAPS Loadout	01/03/13	Gross Alpha/Beta	Gross Alpha	6.589E-15	7.667E-15	1.169E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150789	SLAPS Loadout	01/08/13	Gross Alpha/Beta	Gross Beta	5.937E-14	2.22E-14	2.813E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150789	SLAPS Loadout	01/08/13	Gross Alpha/Beta	Gross Alpha	-8.721E-15	2.665E-14	1.644E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150790	SLAPS Loadout	01/08/13	Gross Alpha/Beta	Gross Beta	3.845E-14	2.07E-14	2.828E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150790	SLAPS Loadout	01/08/13	Gross Alpha/Beta	Gross Alpha	-6.2E-15	2.703E-14	1.653E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150791	SLAPS Loadout	01/07/13	Gross Alpha/Beta	Gross Beta	8.979E-14	2.423E-14	2.799E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150791	SLAPS Loadout	01/07/13	Gross Alpha/Beta	Gross Alpha	2.12E-16	2.735E-14	1.636E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150792	SLAPS Loadout	01/07/13	Gross Alpha/Beta	Gross Beta	8.871E-14	2.444E-14	2.842E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150792	SLAPS Loadout	01/07/13	Gross Alpha/Beta	Gross Alpha	1.504E-15	2.789E-14	1.661E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150793	SLAPS Loadout	01/09/13	Gross Alpha/Beta	Gross Beta	7.245E-14	3.901E-14	5.329E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150793	SLAPS Loadout	01/09/13	Gross Alpha/Beta	Gross Alpha	-1.652E-14	5.048E-14	3.114E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150794	SLAPS Loadout	01/09/13	Gross Alpha/Beta	Gross Alpha	-1.894E-14	5.025E-14	3.114E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150794	SLAPS Loadout	01/09/13	Gross Alpha/Beta	Gross Beta	2.629E-14	3.518E-14	5.329E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150795	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Alpha	3.585E-14	1.729E-14	1.543E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150795	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Beta	2.289E-14	1.435E-14	1.937E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150796	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Beta	2.136E-14	1.466E-14	2.015E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150796	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Alpha	2.473E-15	1.195E-14	1.605E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150797	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Beta	1.603E-14	1.373E-14	1.964E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150797	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Alpha	-5.133E-15	9.878E-15	1.564E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150798	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Beta	1.469E-14	1.379E-14	1.999E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150798	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Alpha	-5.225E-15	1.006E-14	1.592E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150799	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Beta	1.783E-14	1.408E-14	1.987E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150799	SLAPS Loadout	01/17/13	Gross Alpha/Beta	Gross Alpha	-3.922E-15	1.031E-14	1.583E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150800	SLAPS Loadout	01/23/13	Gross Alpha/Beta	Gross Beta	5.533E-14	4.426E-14	5.522E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150800	SLAPS Loadout	01/23/13	Gross Alpha/Beta	Gross Alpha	2.886E-14	2.654E-14	3.761E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150801	SLAPS Loadout	01/23/13	Gross Alpha/Beta	Gross Alpha	9.83E-16	1.524E-14	3.203E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150801	SLAPS Loadout	01/23/13	Gross Alpha/Beta	Gross Beta	1.717E-14	3.458E-14	4.704E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150802	SLAPS Loadout	01/24/13	Gross Alpha/Beta	Gross Alpha	1.25E-14	1.405E-14	2.142E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150802	SLAPS Loadout	01/24/13	Gross Alpha/Beta	Gross Beta	1.649E-14	2.366E-14	3.146E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150803	SLAPS Loadout	01/24/13	Gross Alpha/Beta	Gross Beta	3.931E-14	2.252E-14	2.657E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150803	SLAPS Loadout	01/24/13	Gross Alpha/Beta	Gross Alpha	-4.443E-15	6.382E-15	1.809E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA150804	SLAPS Loadout	01/28/13	Gross Alpha/Beta	Gross Alpha	1.371E-14	1.096E-14	1.243E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150804	SLAPS Loadout	01/28/13	Gross Alpha/Beta	Gross Beta	2.478E-14	1.553E-14	2.232E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150805	SLAPS Loadout	01/28/13	Gross Alpha/Beta	Gross Beta	1.573E-14	1.468E-14	2.285E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150805	SLAPS Loadout	01/28/13	Gross Alpha/Beta	Gross Alpha	9.483E-15	9.911E-15	1.272E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150806	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Alpha	2.92E-16	5.047E-15	9.804E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150806	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Beta	9.155E-15	1.091E-14	1.761E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150807	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Beta	4.784E-14	1.535E-14	1.764E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150807	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Alpha	1.084E-14	8.664E-15	9.822E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150808	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Beta	3.297E-14	1.381E-14	1.764E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150808	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Alpha	1.787E-14	1.04E-14	9.822E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150809	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Beta	2.356E-14	1.286E-14	1.784E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150809	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Alpha	3.85E-15	6.557E-15	9.932E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150810	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Beta	3.074E-14	1.357E-14	1.764E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150810	SLAPS Loadout	01/30/13	Gross Alpha/Beta	Gross Alpha	1.084E-14	8.664E-15	9.822E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150811	SLAPS Loadout	01/31/13	Gross Alpha/Beta	Gross Beta	3.496E-14	1.465E-14	1.871E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150811	SLAPS Loadout	01/31/13	Gross Alpha/Beta	Gross Alpha	6.522E-15	7.723E-15	1.042E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150812	SLAPS Loadout	01/31/13	Gross Alpha/Beta	Gross Beta	4.799E-14	1.592E-14	1.856E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150812	SLAPS Loadout	01/31/13	Gross Alpha/Beta	Gross Alpha	8.937E-15	8.421E-15	1.034E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150813	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Beta	3.662E-14	1.834E-14	2.478E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150813	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Alpha	3.748E-15	7.792E-15	9.33E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150814	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Alpha	3.94E-16	7.089E-15	9.803E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150814	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Beta	1.442E-14	1.729E-14	2.603E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150815	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Alpha	1.561E-15	7.403E-15	9.712E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150815	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Beta	1.652E-14	1.732E-14	2.579E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150816	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Alpha	1.181E-14	9.98E-15	9.483E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150816	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Beta	1.394E-14	1.672E-14	2.518E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150817	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Alpha	1.409E-14	1.05E-14	9.483E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150817	SLAPS Loadout	02/04/13	Gross Alpha/Beta	Gross Beta	2.922E-14	1.8E-14	2.518E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150818	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Beta	5.739E-14	2.073E-14	2.608E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150818	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Alpha	5.129E-15	8.539E-15	9.822E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150819	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Beta	3.201E-14	1.891E-14	2.628E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150819	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Alpha	1.59E-15	7.543E-15	9.896E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150820	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Beta	5.156E-14	2.036E-14	2.618E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150820	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Alpha	5.149E-15	8.572E-15	9.859E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150821	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Beta	4.849E-14	1.962E-14	2.537E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150821	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Alpha	2.11E-14	1.201E-14	9.552E-15	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA150822	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Beta	4.767E-14	1.953E-14	2.532E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150822	SLAPS Loadout	02/05/13	Gross Alpha/Beta	Gross Alpha	7.277E-15	8.908E-15	9.535E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150823	SLAPS Loadout	02/06/13	Gross Alpha/Beta	Gross Beta	3.865E-14	1.904E-14	2.565E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150823	SLAPS Loadout	02/06/13	Gross Alpha/Beta	Gross Alpha	7.372E-15	9.023E-15	9.658E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150824	SLAPS Loadout	02/06/13	Gross Alpha/Beta	Gross Beta	3.124E-14	1.846E-14	2.565E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150824	SLAPS Loadout	02/06/13	Gross Alpha/Beta	Gross Alpha	-7.76E-16	6.584E-15	9.658E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150825	SLAPS Loadout	02/07/13	Gross Alpha/Beta	Gross Beta	4.017E-14	2.373E-14	3.298E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150825	SLAPS Loadout	02/07/13	Gross Alpha/Beta	Gross Alpha	4.99E-16	8.979E-15	1.242E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA150826	SLAPS Loadout	02/07/13	Gross Alpha/Beta	Gross Beta	2.772E-14	2.266E-14	3.29E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150826	SLAPS Loadout	02/07/13	Gross Alpha/Beta	Gross Alpha	-9.95E-16	8.445E-15	1.239E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150827	SLAPS Loadout	02/11/13	Gross Alpha/Beta	Gross Beta	3.752E-14	1.555E-14	1.844E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150827	SLAPS Loadout	02/11/13	Gross Alpha/Beta	Gross Alpha	1.869E-15	5.936E-15	1.169E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150828	SLAPS Loadout	02/11/13	Gross Alpha/Beta	Gross Beta	1.485E-14	1.36E-14	1.915E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150828	SLAPS Loadout	02/11/13	Gross Alpha/Beta	Gross Alpha	5.617E-15	7.486E-15	1.214E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150829	SLAPS Loadout	02/12/13	Gross Alpha/Beta	Gross Beta	3.485E-14	1.54E-14	1.861E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150829	SLAPS Loadout	02/12/13	Gross Alpha/Beta	Gross Alpha	3.077E-15	6.448E-15	1.18E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150830	SLAPS Loadout	02/12/13	Gross Alpha/Beta	Gross Beta	3.797E-14	1.527E-14	1.794E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150830	SLAPS Loadout	02/12/13	Gross Alpha/Beta	Gross Alpha	4.115E-15	6.627E-15	1.137E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150831	SLAPS Loadout	02/13/13	Gross Alpha/Beta	Gross Beta	3.461E-14	1.555E-14	1.889E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150831	SLAPS Loadout	02/13/13	Gross Alpha/Beta	Gross Alpha	-5.04E-16	5.029E-15	1.198E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150832	SLAPS Loadout	02/13/13	Gross Alpha/Beta	Gross Beta	4.586E-14	1.657E-14	1.879E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150832	SLAPS Loadout	02/13/13	Gross Alpha/Beta	Gross Alpha	4.309E-15	6.939E-15	1.191E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150833	SLAPS Loadout	02/14/13	Gross Alpha/Beta	Gross Beta	1.825E-14	1.368E-14	1.864E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150833	SLAPS Loadout	02/14/13	Gross Alpha/Beta	Gross Alpha	3.083E-15	6.46E-15	1.182E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150834	SLAPS Loadout	02/14/13	Gross Alpha/Beta	Gross Beta	3.095E-14	1.496E-14	1.854E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150834	SLAPS Loadout	02/14/13	Gross Alpha/Beta	Gross Alpha	5.439E-15	7.249E-15	1.175E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150835	SLAPS Loadout	02/18/13	Gross Alpha/Beta	Gross Alpha	-2.563E-15	4.684E-15	1.268E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150835	SLAPS Loadout	02/18/13	Gross Alpha/Beta	Gross Beta	1.866E-14	1.87E-14	2.951E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150836	SLAPS Loadout	02/18/13	Gross Alpha/Beta	Gross Beta	2.08E-14	1.927E-14	3.015E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150836	SLAPS Loadout	02/18/13	Gross Alpha/Beta	Gross Alpha	1.14E-16	6.15E-15	1.296E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150837	SLAPS Loadout	02/19/13	Gross Alpha/Beta	Gross Alpha	-2.171E-15	3.967E-15	1.074E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150837	SLAPS Loadout	02/19/13	Gross Alpha/Beta	Gross Beta	1.147E-14	1.544E-14	2.499E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150838	SLAPS Loadout	02/19/13	Gross Alpha/Beta	Gross Alpha	2.518E-15	6.427E-15	1.146E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150838	SLAPS Loadout	02/19/13	Gross Alpha/Beta	Gross Beta	6.861E-15	1.597E-14	2.667E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150839	SLAPS Loadout	02/20/13	Gross Alpha/Beta	Gross Beta	3.025E-14	1.785E-14	2.627E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150839	SLAPS Loadout	02/20/13	Gross Alpha/Beta	Gross Alpha	2.48E-15	6.329E-15	1.129E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150840	SLAPS Loadout	02/20/13	Gross Alpha/Beta	Gross Alpha	-1.106E-15	4.865E-15	1.144E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150840	SLAPS Loadout	02/20/13	Gross Alpha/Beta	Gross Beta	1.53E-14	1.673E-14	2.662E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150841	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Beta	3.731E-14	1.929E-14	2.243E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150841	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Alpha	-1.927E-15	1.516E-14	1.636E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150842	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Beta	5.285E-14	2.848E-14	3.342E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150842	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Alpha	5.741E-15	2.418E-14	2.438E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150843	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Beta	5.572E-14	2.941E-14	3.435E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150843	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Alpha	-9.589E-15	2.192E-14	2.506E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150844	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Beta	5.894E-14	2.989E-14	3.459E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150844	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Alpha	-7.428E-15	2.251E-14	2.523E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150845	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Beta	6.648E-14	3.077E-14	3.483E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150845	SLAPS Loadout	02/25/13	Gross Alpha/Beta	Gross Alpha	-7.48E-15	2.267E-14	2.541E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150846	SLAPS Loadout	02/26/13	Gross Alpha/Beta	Gross Alpha	-1.239E-14	5.47E-14	6.014E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150846	SLAPS Loadout	02/26/13	Gross Alpha/Beta	Gross Beta	5.619E-14	6.269E-14	8.244E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150847	SLAPS Loadout	02/26/13	Gross Alpha/Beta	Gross Alpha	-1.293E-14	5.708E-14	6.275E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150847	SLAPS Loadout	02/26/13	Gross Alpha/Beta	Gross Beta	1.29E-14	6.028E-14	8.602E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA150848	SLAPS Loadout	02/27/13	Gross Alpha/Beta	Gross Beta	2.672E-14	1.539E-14	1.832E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150848	SLAPS Loadout	02/27/13	Gross Alpha/Beta	Gross Alpha	-1.574E-15	1.238E-14	1.336E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150849	SLAPS Loadout	02/27/13	Gross Alpha/Beta	Gross Beta	3.786E-14	1.695E-14	1.902E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150849	SLAPS Loadout	02/27/13	Gross Alpha/Beta	Gross Alpha	-1.634E-15	1.286E-14	1.388E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150850	SLAPS Loadout	02/28/13	Gross Alpha/Beta	Gross Beta	5.124E-14	2.222E-14	2.473E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150850	SLAPS Loadout	02/28/13	Gross Alpha/Beta	Gross Alpha	1.062E-15	1.731E-14	1.804E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150851	SLAPS Loadout	02/28/13	Gross Alpha/Beta	Gross Beta	5.671E-14	2.317E-14	2.537E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA150851	SLAPS Loadout	02/28/13	Gross Alpha/Beta	Gross Alpha	-2.179E-15	1.714E-14	1.85E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150852	SLAPS Loadout	03/04/13	Gross Alpha/Beta	Gross Beta	1.811E-14	1.656E-14	2.64E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150852	SLAPS Loadout	03/04/13	Gross Alpha/Beta	Gross Alpha	3.84E-16	5.906E-15	1.165E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150853	SLAPS Loadout	03/04/13	Gross Alpha/Beta	Gross Alpha	-8.06E-16	5.698E-15	1.221E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150853	SLAPS Loadout	03/04/13	Gross Alpha/Beta	Gross Beta	5.899E-15	1.616E-14	2.767E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150854	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-1.103E-14	2.825E-14	6.684E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150854	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	-1.404E-15	8.516E-14	1.515E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150855	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-3.088E-14	1.657E-14	6.684E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150855	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	-3.51E-14	8.176E-14	1.515E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150856	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-4.411E-15	3.119E-14	6.684E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150856	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	-5.615E-15	8.475E-14	1.515E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150857	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-2.004E-14	1.75E-14	5.522E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150857	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	4.755E-14	7.502E-14	1.251E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150858	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-9.699E-15	2.485E-14	5.88E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150858	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	3.211E-14	7.814E-14	1.332E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150859	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	8.38E-15	3.456E-14	6.35E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150859	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	2.267E-14	8.325E-14	1.439E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150860	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-4.108E-15	2.905E-14	6.226E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150860	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	-2.092E-14	7.735E-14	1.411E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150861	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	1.017E-13	8.972E-14	1.425E-13	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150861	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-4.149E-15	2.934E-14	6.287E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150862	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-1.103E-14	2.825E-14	6.684E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150862	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	2.808E-15	8.558E-14	1.515E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150863	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Alpha	-2.095E-14	2.965E-14	7.938E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150863	SLAPS Loadout	03/05/13	Gross Alpha/Beta	Gross Beta	-6.668E-14	9.448E-14	1.799E-13	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150864	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Beta	2.877E-14	1.851E-14	2.822E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150864	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Alpha	-2.054E-15	5.262E-15	1.245E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150865	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Beta	2.714E-14	1.834E-14	2.816E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150865	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Alpha	4.1E-15	7.607E-15	1.243E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150866	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Beta	1.574E-14	1.439E-14	1.948E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150866	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Alpha	3.423E-15	8.085E-15	1.313E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150867	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Beta	2.364E-14	1.524E-14	1.948E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150867	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Alpha	9.34E-16	7.278E-15	1.313E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150868	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Beta	2.723E-14	1.982E-14	2.591E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150868	SLAPS Loadout	03/06/13	Gross Alpha/Beta	Gross Alpha	-5.38E-15	7.06E-15	1.747E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150869	SLAPS Loadout	03/07/13	Gross Alpha/Beta	Gross Beta	2.142E-14	1.381E-14	1.765E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150869	SLAPS Loadout	03/07/13	Gross Alpha/Beta	Gross Alpha	8.46E-16	6.595E-15	1.19E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA150870	SLAPS Loadout	03/07/13	Gross Alpha/Beta	Gross Alpha	4.23E-15	7.666E-15	1.19E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150870	SLAPS Loadout	03/07/13	Gross Alpha/Beta	Gross Beta	1.068E-14	1.264E-14	1.765E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150871	SLAPS Loadout	03/11/13	Gross Alpha/Beta	Gross Alpha	-4.99E-16	9.43E-15	1.949E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150871	SLAPS Loadout	03/11/13	Gross Alpha/Beta	Gross Beta	3.07E-15	3.229E-14	4.551E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150872	SLAPS Loadout	03/11/13	Gross Alpha/Beta	Gross Beta	4.052E-14	3.365E-14	4.344E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150872	SLAPS Loadout	03/11/13	Gross Alpha/Beta	Gross Alpha	-6.19E-15	6.13E-15	1.86E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150873	SLAPS Loadout	03/12/13	Gross Alpha/Beta	Gross Alpha	8.65E-16	5.918E-15	1.126E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150873	SLAPS Loadout	03/12/13	Gross Alpha/Beta	Gross Beta	1.425E-14	1.962E-14	2.631E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150874	SLAPS Loadout	03/12/13	Gross Alpha/Beta	Gross Beta	2.38E-14	2.032E-14	2.631E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150874	SLAPS Loadout	03/12/13	Gross Alpha/Beta	Gross Alpha	3.171E-15	6.759E-15	1.126E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150875	SLAPS Loadout	03/26/13	Gross Alpha/Beta	Gross Alpha	3.308E-15	5.985E-15	1.075E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150875	SLAPS Loadout	03/26/13	Gross Alpha/Beta	Gross Beta	2.738E-15	1.663E-14	2.899E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150876	SLAPS Loadout	03/26/13	Gross Alpha/Beta	Gross Alpha	-1.944E-15	2.734E-15	1.052E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150876	SLAPS Loadout	03/26/13	Gross Alpha/Beta	Gross Beta	7.631E-15	1.678E-14	2.839E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150877	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Alpha	3.291E-15	1.273E-14	2.484E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150877	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Beta	4.609E-14	4.901E-14	6.983E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150878	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Alpha	3.397E-15	1.314E-14	2.565E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150878	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Beta	1.081E-14	4.735E-14	7.209E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150879	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Alpha	3.786E-15	1.465E-14	2.858E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150879	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Beta	-7.231E-15	5.097E-14	8.034E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150880	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Alpha	7.351E-15	1.601E-14	2.775E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150880	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Beta	5.148E-14	5.474E-14	7.799E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150881	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Alpha	3.592E-15	1.389E-14	2.711E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150881	SLAPS Loadout	04/08/13	Gross Alpha/Beta	Gross Beta	1.829E-14	5.067E-14	7.621E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150882	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Alpha	8.899E-15	7.305E-15	8.397E-15	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA150882	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Beta	1.983E-14	1.693E-14	2.361E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150883	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Alpha	0	3.677E-15	8.383E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150883	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Beta	1.414E-14	1.642E-14	2.356E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150884	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Beta	2.841E-14	2.789E-14	3.946E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA150884	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Alpha	1.86E-15	7.194E-15	1.404E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150885	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Alpha	0	4.093E-15	9.33E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150885	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Beta	1.18E-14	1.793E-14	2.623E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150886	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Alpha	7.394E-15	9.606E-15	1.396E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150886	SLAPS Loadout	04/09/13	Gross Alpha/Beta	Gross Beta	2.001E-14	2.702E-14	3.923E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150887	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Alpha	0	4.785E-15	1.193E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150887	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Beta	-1.488E-14	1.77E-14	3.093E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150888	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Alpha	1.381E-15	5.526E-15	1.193E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150888	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Beta	1.942E-14	2.083E-14	3.093E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150889	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Alpha	4.19E-15	6.846E-15	1.206E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150889	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Beta	8.076E-15	2.006E-14	3.128E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150890	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Alpha	-1.397E-15	3.951E-15	1.206E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150890	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Beta	2.741E-15	1.958E-14	3.128E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150891	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Alpha	2.793E-15	6.248E-15	1.206E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA150891	SLAPS Loadout	04/16/13	Gross Alpha/Beta	Gross Beta	9.854E-15	2.022E-14	3.128E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA151851	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Alpha	2.328E-15	9.312E-15	2.011E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151851	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Beta	2.976E-14	3.485E-14	5.213E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151852	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Beta	5.832E-14	3.661E-14	5.118E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151852	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Alpha	4.571E-15	1.022E-14	1.974E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151853	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Alpha	-4.656E-15	4.661E-15	2.011E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151853	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Beta	9.015E-15	3.304E-14	5.213E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151854	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Alpha	-2.205E-15	6.239E-15	1.905E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151854	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Beta	1.556E-14	3.192E-14	4.938E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151855	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Beta	3.717E-14	3.547E-14	5.213E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151855	SLAPS Loadout	04/17/13	Gross Alpha/Beta	Gross Alpha	-2.328E-15	6.585E-15	2.011E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151856	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Alpha	1.142E-15	7.1E-15	1.534E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151856	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Beta	2.498E-14	2.832E-14	3.877E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151857	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Alpha	-3.379E-15	1.069E-14	2.383E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151857	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Beta	2.259E-14	3.004E-14	4.959E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151858	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Alpha	3.416E-15	1.278E-14	2.409E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151858	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Beta	7.611E-15	2.925E-14	5.013E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151859	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Alpha	-1.137E-15	7.539E-15	1.603E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151859	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Beta	2.894E-15	1.931E-14	3.336E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151860	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Alpha	-1.204E-15	7.987E-15	1.698E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151860	SLAPS Loadout	05/07/13	Gross Alpha/Beta	Gross Beta	1.763E-14	2.152E-14	3.534E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151861	SLAPS Loadout	05/20/13	Gross Alpha/Beta	Gross Beta	2.689E-14	1.788E-14	2.366E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151861	SLAPS Loadout	05/20/13	Gross Alpha/Beta	Gross Alpha	4.639E-15	9.352E-15	1.499E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151862	SLAPS Loadout	05/20/13	Gross Alpha/Beta	Gross Beta	2.131E-14	1.728E-14	2.366E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151862	SLAPS Loadout	05/20/13	Gross Alpha/Beta	Gross Alpha	1.05E-14	1.104E-14	1.499E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151863	SLAPS Loadout	05/21/13	Gross Alpha/Beta	Gross Beta	1.508E-14	1.325E-14	1.835E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151863	SLAPS Loadout	05/21/13	Gross Alpha/Beta	Gross Alpha	-2.083E-15	5.174E-15	1.163E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151864	SLAPS Loadout	05/21/13	Gross Alpha/Beta	Gross Alpha	-2.086E-15	5.183E-15	1.165E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151864	SLAPS Loadout	05/21/13	Gross Alpha/Beta	Gross Beta	1.005E-14	1.27E-14	1.838E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151865	SLAPS Loadout	05/22/13	Gross Alpha/Beta	Gross Alpha	3.772E-15	7.604E-15	1.219E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151865	SLAPS Loadout	05/22/13	Gross Alpha/Beta	Gross Beta	2.962E-15	1.241E-14	1.924E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151866	SLAPS Loadout	05/23/13	Gross Alpha/Beta	Gross Alpha	2.77E-14	1.352E-14	1.279E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151866	SLAPS Loadout	05/23/13	Gross Alpha/Beta	Gross Beta	2.427E-13	3.091E-14	2.018E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151867	SLAPS Loadout	05/29/13	Gross Alpha/Beta	Gross Beta	1.109E-13	3.671E-14	4.036E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151867	SLAPS Loadout	05/29/13	Gross Alpha/Beta	Gross Alpha	2.916E-15	1.43E-14	2.558E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151868	SLAPS Loadout	05/29/13	Gross Alpha/Beta	Gross Alpha	4.17E-16	1.34E-14	2.558E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151868	SLAPS Loadout	05/29/13	Gross Alpha/Beta	Gross Beta	7.8E-15	2.622E-14	4.036E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151869	SLAPS Loadout	06/05/13	Gross Alpha/Beta	Gross Beta	3.558E-14	1.455E-14	1.83E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151869	SLAPS Loadout	06/05/13	Gross Alpha/Beta	Gross Alpha	8.442E-15	8.327E-15	1.206E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151870	SLAPS Loadout	06/05/13	Gross Alpha/Beta	Gross Beta	1.917E-14	1.276E-14	1.834E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151870	SLAPS Loadout	06/05/13	Gross Alpha/Beta	Gross Alpha	-2.164E-15	4.404E-15	1.208E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151871	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Beta	5.09E-14	2.786E-14	3.823E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151871	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Alpha	4.1E-16	1.152E-14	2.518E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151872	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Beta	4.364E-14	2.653E-14	3.737E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151872	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Alpha	1.964E-14	1.767E-14	2.461E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA151873	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Beta	3.013E-14	1.389E-14	1.817E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151873	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Alpha	3.703E-15	6.812E-15	1.197E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151874	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Alpha	-1.924E-15	9.776E-15	2.363E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151874	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Beta	1.258E-14	2.182E-14	3.588E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151875	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Beta	2.134E-14	1.335E-14	1.893E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151875	SLAPS Loadout	06/06/13	Gross Alpha/Beta	Gross Alpha	5.077E-15	7.505E-15	1.247E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151876	SLAPS Loadout	06/10/13	Gross Alpha/Beta	Gross Beta	2.617E-14	1.337E-14	1.8E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151876	SLAPS Loadout	06/10/13	Gross Alpha/Beta	Gross Alpha	5.987E-15	7.504E-15	1.186E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151877	SLAPS Loadout	06/10/13	Gross Alpha/Beta	Gross Beta	1.545E-14	1.185E-14	1.753E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151877	SLAPS Loadout	06/10/13	Gross Alpha/Beta	Gross Alpha	3.572E-15	6.571E-15	1.154E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151878	SLAPS Loadout	06/11/13	Gross Alpha/Beta	Gross Beta	3.149E-14	1.375E-14	1.768E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151878	SLAPS Loadout	06/11/13	Gross Alpha/Beta	Gross Alpha	5.88E-15	7.37E-15	1.165E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151879	SLAPS Loadout	06/11/13	Gross Alpha/Beta	Gross Beta	1.402E-14	1.167E-14	1.753E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151879	SLAPS Loadout	06/11/13	Gross Alpha/Beta	Gross Alpha	3.572E-15	6.571E-15	1.154E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151880	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Beta	2.211E-14	1.24E-14	1.713E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151880	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Alpha	7.902E-15	7.794E-15	1.128E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151881	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Beta	2.081E-14	1.231E-14	1.722E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151881	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Alpha	4.618E-15	6.827E-15	1.134E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151882	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Beta	2.13E-14	1.259E-14	1.762E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151882	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Alpha	5.859E-15	7.344E-15	1.161E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151883	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Beta	2.346E-14	1.284E-14	1.762E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151883	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Alpha	4.725E-15	6.985E-15	1.161E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151884	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Beta	1.776E-14	1.221E-14	1.768E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151884	SLAPS Loadout	06/12/13	Gross Alpha/Beta	Gross Alpha	8.156E-15	8.044E-15	1.165E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151885	SLAPS Loadout	06/13/13	Gross Alpha/Beta	Gross Beta	2.141E-14	1.302E-14	1.834E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151885	SLAPS Loadout	06/13/13	Gross Alpha/Beta	Gross Alpha	1.97E-16	5.526E-15	1.208E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151886	SLAPS Loadout	06/13/13	Gross Alpha/Beta	Gross Beta	3.19E-14	1.418E-14	1.834E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151886	SLAPS Loadout	06/13/13	Gross Alpha/Beta	Gross Alpha	2.557E-15	6.456E-15	1.208E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151887	SLAPS Loadout	06/17/13	Gross Alpha/Beta	Gross Beta	2.176E-14	1.287E-14	1.8E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151887	SLAPS Loadout	06/17/13	Gross Alpha/Beta	Gross Alpha	3.669E-15	6.75E-15	1.186E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151888	SLAPS Loadout	06/17/13	Gross Alpha/Beta	Gross Beta	1.428E-14	1.188E-14	1.784E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151888	SLAPS Loadout	06/17/13	Gross Alpha/Beta	Gross Alpha	2.488E-15	6.282E-15	1.175E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151889	SLAPS Loadout	06/18/13	Gross Alpha/Beta	Gross Beta	3.25E-14	1.445E-14	1.868E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151889	SLAPS Loadout	06/18/13	Gross Alpha/Beta	Gross Alpha	1.403E-15	6.123E-15	1.231E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151890	SLAPS Loadout	06/18/13	Gross Alpha/Beta	Gross Beta	2.335E-14	1.344E-14	1.868E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151890	SLAPS Loadout	06/18/13	Gross Alpha/Beta	Gross Alpha	-1.002E-15	5.091E-15	1.231E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151891	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Beta	1.808E-14	1.503E-14	2.173E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151891	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Alpha	3.62E-16	7.977E-15	1.581E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151892	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Beta	1.782E-14	1.225E-14	1.707E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151892	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Alpha	2.561E-15	7.046E-15	1.242E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151893	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Beta	2.869E-14	2.75E-14	4.068E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151893	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Alpha	-2.034E-15	1.392E-14	2.961E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151894	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Beta	6.329E-14	3.232E-14	4.193E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151894	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Alpha	9.084E-15	1.819E-14	3.052E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA151895	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Alpha	-1.31E-14	8.876E-15	3.012E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151895	SLAPS Loadout	07/15/13	Gross Alpha/Beta	Gross Beta	2.394E-14	2.731E-14	4.138E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151896	SLAPS Loadout	07/16/13	Gross Alpha/Beta	Gross Alpha	2.747E-15	1.288E-14	2.399E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151896	SLAPS Loadout	07/16/13	Gross Alpha/Beta	Gross Beta	2.325E-15	1.949E-14	3.296E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151897	SLAPS Loadout	07/16/13	Gross Alpha/Beta	Gross Alpha	7.671E-15	1.536E-14	2.577E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151897	SLAPS Loadout	07/16/13	Gross Alpha/Beta	Gross Beta	1.598E-14	2.278E-14	3.54E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151898	SLAPS Loadout	07/25/13	Gross Alpha/Beta	Gross Beta	2.746E-14	1.728E-14	2.544E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151898	SLAPS Loadout	07/25/13	Gross Alpha/Beta	Gross Alpha	-9.63E-16	3.358E-15	9.786E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151899	SLAPS Loadout	07/25/13	Gross Alpha/Beta	Gross Beta	2.998E-14	2.486E-14	3.782E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151899	SLAPS Loadout	07/25/13	Gross Alpha/Beta	Gross Alpha	3.791E-15	8.335E-15	1.605E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151900	SLAPS Loadout	07/29/13	Gross Alpha/Beta	Gross Alpha	3.504E-15	7.704E-15	1.483E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151900	SLAPS Loadout	07/29/13	Gross Alpha/Beta	Gross Beta	1.785E-14	2.173E-14	3.495E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151901	SLAPS Loadout	07/29/13	Gross Alpha/Beta	Gross Alpha	-4.749E-15	1.142E-15	2.247E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151901	SLAPS Loadout	07/29/13	Gross Alpha/Beta	Gross Beta	2.063E-14	3.208E-14	5.294E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151902	SLAPS Loadout	07/30/13	Gross Alpha/Beta	Gross Beta	3.607E-14	2.56E-14	3.782E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151902	SLAPS Loadout	07/30/13	Gross Alpha/Beta	Gross Alpha	1.097E-14	1.177E-14	1.605E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151903	SLAPS Loadout	07/30/13	Gross Alpha/Beta	Gross Alpha	-1.007E-15	4.902E-15	1.62E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151903	SLAPS Loadout	07/30/13	Gross Alpha/Beta	Gross Beta	1.949E-14	2.374E-14	3.818E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151904	SLAPS Loadout	07/31/13	Gross Alpha/Beta	Gross Beta	4.065E-14	2.614E-14	3.782E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151904	SLAPS Loadout	07/31/13	Gross Alpha/Beta	Gross Alpha	6.185E-15	9.616E-15	1.605E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151905	SLAPS Loadout	07/31/13	Gross Alpha/Beta	Gross Alpha	6.127E-15	9.525E-15	1.59E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151905	SLAPS Loadout	07/31/13	Gross Alpha/Beta	Gross Beta	1.611E-14	2.29E-14	3.746E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151906	SLAPS Loadout	08/01/13	Gross Alpha/Beta	Gross Beta	3.164E-14	2.417E-14	3.623E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151906	SLAPS Loadout	08/01/13	Gross Alpha/Beta	Gross Alpha	1.051E-14	1.128E-14	1.538E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151907	SLAPS Loadout	08/01/13	Gross Alpha/Beta	Gross Beta	4.949E-14	2.77E-14	3.878E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151907	SLAPS Loadout	08/01/13	Gross Alpha/Beta	Gross Alpha	-3.478E-15	8.36E-16	1.646E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151908	SLAPS Loadout	08/05/13	Gross Alpha/Beta	Gross Beta	1.954E-14	1.222E-14	1.773E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151908	SLAPS Loadout	08/05/13	Gross Alpha/Beta	Gross Alpha	1.314E-15	6.443E-15	1.152E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151909	SLAPS Loadout	08/05/13	Gross Alpha/Beta	Gross Beta	2.659E-14	1.298E-14	1.767E-14	µCi/mL	J	F01	SLAPS (General Area)-Perimeter Air
SLA151909	SLAPS Loadout	08/05/13	Gross Alpha/Beta	Gross Alpha	1.309E-15	6.42E-15	1.148E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151910	SLAPS Loadout	08/06/13	Gross Alpha/Beta	Gross Beta	2.185E-14	1.366E-14	1.984E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151910	SLAPS Loadout	08/06/13	Gross Alpha/Beta	Gross Alpha	3.988E-15	8.04E-15	1.289E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151911	SLAPS Loadout	08/06/13	Gross Alpha/Beta	Gross Beta	1.744E-14	1.288E-14	1.938E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151911	SLAPS Loadout	08/06/13	Gross Alpha/Beta	Gross Alpha	3.896E-15	7.853E-15	1.259E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151912	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Beta	2.667E-14	1.575E-14	2.256E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151912	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Alpha	4.535E-15	9.142E-15	1.466E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151913	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Alpha	-3.611E-15	5.216E-15	1.304E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151913	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Beta	1.241E-14	1.263E-14	2.007E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151914	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Beta	2.403E-14	2.316E-14	3.65E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151914	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Alpha	-4.249E-15	1.056E-14	2.372E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151915	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Beta	3.805E-14	2.452E-14	3.585E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151915	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Alpha	7.207E-15	1.453E-14	2.329E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151916	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Alpha	9.586E-15	1.539E-14	2.355E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151916	SLAPS Loadout	08/07/13	Gross Alpha/Beta	Gross Beta	2.239E-14	2.28E-14	3.623E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA151917	SLAPS Loadout	08/08/13	Gross Alpha/Beta	Gross Beta	3.916E-14	1.526E-14	1.93E-14	µCi/mL	J	F01	SLAPS (General Area)-Perimeter Air
SLA151917	SLAPS Loadout	08/08/13	Gross Alpha/Beta	Gross Alpha	8.783E-15	9.235E-15	1.254E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151918	SLAPS Loadout	08/12/13	Gross Alpha/Beta	Gross Beta	2.198E-14	1.298E-14	1.859E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151918	SLAPS Loadout	08/12/13	Gross Alpha/Beta	Gross Alpha	1.377E-15	6.753E-15	1.208E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151919	SLAPS Loadout	08/12/13	Gross Alpha/Beta	Gross Beta	2.608E-14	1.631E-14	2.367E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151919	SLAPS Loadout	08/12/13	Gross Alpha/Beta	Gross Alpha	6.263E-15	1.006E-14	1.538E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151920	SLAPS Loadout	08/19/13	Gross Alpha/Beta	Gross Beta	1.09E-13	5.957E-14	8.364E-14	µCi/mL	J	F01, T04	SLAPS (General Area)-Perimeter Air
SLA151920	SLAPS Loadout	08/19/13	Gross Alpha/Beta	Gross Alpha	1.682E-14	3.39E-14	5.435E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151921	SLAPS Loadout	08/19/13	Gross Alpha/Beta	Gross Alpha	7.081E-15	3.473E-14	6.212E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151921	SLAPS Loadout	08/19/13	Gross Alpha/Beta	Gross Beta	5.908E-14	6.016E-14	9.559E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151922	SLAPS Loadout	08/20/13	Gross Alpha/Beta	Gross Beta	4.374E-14	1.757E-14	2.245E-14	µCi/mL	J	F01	SLAPS (General Area)-Perimeter Air
SLA151922	SLAPS Loadout	08/20/13	Gross Alpha/Beta	Gross Alpha	8.792E-15	1.036E-14	1.459E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151923	SLAPS Loadout	08/20/13	Gross Alpha/Beta	Gross Beta	4.475E-14	1.744E-14	2.206E-14	µCi/mL	J	F01	SLAPS (General Area)-Perimeter Air
SLA151923	SLAPS Loadout	08/20/13	Gross Alpha/Beta	Gross Alpha	7.237E-15	9.781E-15	1.433E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151924	SLAPS Loadout	08/22/13	Gross Alpha/Beta	Gross Beta	4.607E-14	2.198E-14	2.533E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151924	SLAPS Loadout	08/22/13	Gross Alpha/Beta	Gross Alpha	3.171E-15	5.613E-15	9.044E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151925	SLAPS Loadout	08/22/13	Gross Alpha/Beta	Gross Beta	5.395E-14	2.441E-14	2.789E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151925	SLAPS Loadout	08/22/13	Gross Alpha/Beta	Gross Alpha	-2.857E-15	2.435E-15	9.958E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151926	SLAPS Loadout	08/26/13	Gross Alpha/Beta	Gross Alpha	9.999E-15	7.905E-15	8.962E-15	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151926	SLAPS Loadout	08/26/13	Gross Alpha/Beta	Gross Beta	2.819E-14	2.058E-14	2.51E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151927	SLAPS Loadout	08/26/13	Gross Alpha/Beta	Gross Beta	2.748E-14	2.105E-14	2.581E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151927	SLAPS Loadout	08/26/13	Gross Alpha/Beta	Gross Alpha	4.406E-15	6.183E-15	9.213E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151928	SLAPS Loadout	08/27/13	Gross Alpha/Beta	Gross Alpha	4.86E-15	6.821E-15	1.016E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151928	SLAPS Loadout	08/27/13	Gross Alpha/Beta	Gross Beta	2.124E-14	2.256E-14	2.847E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151929	SLAPS Loadout	08/27/13	Gross Alpha/Beta	Gross Beta	2.965E-14	2.27E-14	2.784E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151929	SLAPS Loadout	08/27/13	Gross Alpha/Beta	Gross Alpha	4.752E-15	6.669E-15	9.938E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151930	SLAPS Loadout	08/28/13	Gross Alpha/Beta	Gross Beta	3.834E-14	2.163E-14	2.557E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151930	SLAPS Loadout	08/28/13	Gross Alpha/Beta	Gross Alpha	2.037E-15	5.163E-15	9.128E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151931	SLAPS Loadout	08/29/13	Gross Alpha/Beta	Gross Beta	3.118E-14	2.225E-14	2.707E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151931	SLAPS Loadout	08/29/13	Gross Alpha/Beta	Gross Alpha	7.086E-15	7.368E-15	9.665E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151932	SLAPS Loadout	09/03/13	Gross Alpha/Beta	Gross Alpha	1.571E-14	2.205E-14	3.286E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151932	SLAPS Loadout	09/03/13	Gross Alpha/Beta	Gross Beta	4.735E-14	7.137E-14	9.204E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151933	SLAPS Loadout	09/03/13	Gross Alpha/Beta	Gross Beta	2.405E-14	2.234E-14	2.789E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151933	SLAPS Loadout	09/03/13	Gross Alpha/Beta	Gross Alpha	9.52E-16	5.026E-15	9.958E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151934	SLAPS Loadout	09/04/13	Gross Alpha/Beta	Gross Beta	3.36E-14	2.245E-14	2.713E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151934	SLAPS Loadout	09/04/13	Gross Alpha/Beta	Gross Alpha	9.57E-15	8.174E-15	9.684E-15	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151935	SLAPS Loadout	09/04/13	Gross Alpha/Beta	Gross Beta	4.181E-14	2.244E-14	2.635E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151935	SLAPS Loadout	09/04/13	Gross Alpha/Beta	Gross Alpha	3.299E-15	5.838E-15	9.407E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151936	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Alpha	0	1.27E-14	2.723E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151936	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Beta	2.853E-14	2.961E-14	4.392E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151937	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Beta	4.011E-14	3.158E-14	4.491E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151937	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Alpha	1.749E-14	1.93E-14	2.785E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151938	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Beta	3.829E-14	3.137E-14	4.491E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151938	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Alpha	1.749E-14	1.93E-14	2.785E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA151939	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Beta	3.933E-14	1.599E-14	1.937E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151939	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Alpha	2.515E-15	6.636E-15	1.201E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151940	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Alpha	-2.515E-15	4.329E-15	1.201E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151940	SLAPS Loadout	09/05/13	Gross Alpha/Beta	Gross Beta	1.573E-15	1.166E-14	1.937E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151941	SLAPS Loadout	09/09/13	Gross Alpha/Beta	Gross Beta	5.226E-14	1.643E-14	1.813E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151941	SLAPS Loadout	09/09/13	Gross Alpha/Beta	Gross Alpha	1.647E-14	1.025E-14	1.124E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151942	SLAPS Loadout	09/09/13	Gross Alpha/Beta	Gross Beta	5.423E-14	1.672E-14	1.83E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151942	SLAPS Loadout	09/09/13	Gross Alpha/Beta	Gross Alpha	1.544E-14	1.007E-14	1.135E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151943	SLAPS Loadout	09/10/13	Gross Alpha/Beta	Gross Beta	5.135E-14	1.739E-14	1.976E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151943	SLAPS Loadout	09/10/13	Gross Alpha/Beta	Gross Alpha	7.695E-15	8.493E-15	1.225E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151944	SLAPS Loadout	09/10/13	Gross Alpha/Beta	Gross Beta	4.51E-14	1.662E-14	1.949E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151944	SLAPS Loadout	09/10/13	Gross Alpha/Beta	Gross Alpha	5.059E-15	7.573E-15	1.209E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151945	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Beta	5.56E-14	1.766E-14	1.957E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151945	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Alpha	1.143E-14	9.49E-15	1.213E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151946	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Beta	6.509E-14	2.686E-14	3.272E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151946	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Alpha	1.274E-14	1.406E-14	2.029E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151947	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Beta	7.837E-14	2.816E-14	3.272E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151947	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Alpha	1.699E-14	1.529E-14	2.029E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA151948	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Beta	3.789E-14	2.367E-14	3.219E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151948	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Alpha	6.266E-15	1.179E-14	1.996E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA151949	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Beta	6.135E-14	1.805E-14	1.937E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151949	SLAPS Loadout	09/11/13	Gross Alpha/Beta	Gross Alpha	1.76E-14	1.095E-14	1.201E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA151950	SLAPS Loadout	09/12/13	Gross Alpha/Beta	Gross Beta	3.895E-14	1.583E-14	1.919E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA151950	SLAPS Loadout	09/12/13	Gross Alpha/Beta	Gross Alpha	3.735E-15	7.027E-15	1.19E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154488	SLAPS Loadout	09/12/13	Gross Alpha/Beta	Gross Beta	3.175E-14	1.503E-14	1.908E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154488	SLAPS Loadout	09/12/13	Gross Alpha/Beta	Gross Alpha	1.238E-15	6.046E-15	1.183E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154489	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Beta	3.026E-14	1.682E-14	2.541E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154489	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Alpha	-1.708E-15	6.985E-15	1.135E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154490	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Beta	5.03E-14	1.904E-14	2.641E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154490	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Alpha	-2.959E-15	6.866E-15	1.18E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154491	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Beta	4.589E-14	1.898E-14	2.692E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154491	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Alpha	4.222E-15	9.161E-15	1.203E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154492	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Beta	4.273E-14	1.869E-14	2.687E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154492	SLAPS Loadout	09/16/13	Gross Alpha/Beta	Gross Alpha	-6.02E-16	7.769E-15	1.201E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154493	SLAPS Loadout	09/18/13	Gross Alpha/Beta	Gross Beta	6.703E-14	2.167E-14	2.874E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154493	SLAPS Loadout	09/18/13	Gross Alpha/Beta	Gross Alpha	6.44E-16	8.7E-15	1.284E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154494	SLAPS Loadout	09/19/13	Gross Alpha/Beta	Gross Beta	6.624E-14	2.03E-14	2.646E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154494	SLAPS Loadout	09/19/13	Gross Alpha/Beta	Gross Alpha	4.151E-15	9.005E-15	1.182E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154495	SLAPS Loadout	09/19/13	Gross Alpha/Beta	Gross Beta	5.464E-14	1.913E-14	2.597E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154495	SLAPS Loadout	09/19/13	Gross Alpha/Beta	Gross Alpha	4.074E-15	8.838E-15	1.161E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154496	SLAPS Loadout	09/23/13	Gross Alpha/Beta	Gross Beta	3.737E-14	1.825E-14	2.687E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154496	SLAPS Loadout	09/23/13	Gross Alpha/Beta	Gross Alpha	-6.02E-16	7.769E-15	1.201E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154497	SLAPS Loadout	09/23/13	Gross Alpha/Beta	Gross Beta	2.455E-14	1.637E-14	2.55E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154497	SLAPS Loadout	09/23/13	Gross Alpha/Beta	Gross Alpha	4E-15	8.678E-15	1.139E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA154498	SLAPS Loadout	09/24/13	Gross Alpha/Beta	Gross Beta	3.467E-14	1.785E-14	2.656E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154498	SLAPS Loadout	09/24/13	Gross Alpha/Beta	Gross Alpha	2.976E-15	8.719E-15	1.187E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154499	SLAPS Loadout	09/24/13	Gross Alpha/Beta	Gross Beta	3.908E-14	1.789E-14	2.597E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154499	SLAPS Loadout	09/24/13	Gross Alpha/Beta	Gross Alpha	2.91E-15	8.525E-15	1.161E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154500	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Beta	2.87E-14	1.484E-14	2.03E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154500	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Alpha	6.693E-15	8.163E-15	1.219E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154501	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Beta	1.499E-14	1.329E-14	2.038E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154501	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Alpha	8.021E-15	8.599E-15	1.224E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154502	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Beta	3.293E-14	1.598E-14	2.147E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154502	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Alpha	2.28E-16	6.082E-15	1.289E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154503	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Alpha	8.468E-15	9.078E-15	1.292E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154503	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Beta	1.324E-14	1.371E-14	2.152E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154504	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Beta	4.684E-14	1.748E-14	2.157E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154504	SLAPS Loadout	09/25/13	Gross Alpha/Beta	Gross Alpha	8.486E-15	9.097E-15	1.295E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154505	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Beta	3.026E-14	1.499E-14	2.026E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154505	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Alpha	5.387E-15	7.725E-15	1.217E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154506	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Beta	3.903E-14	1.639E-14	2.107E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154506	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Alpha	4.257E-15	7.57E-15	1.265E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154507	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Beta	2.475E-14	1.444E-14	2.038E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154507	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Alpha	1.518E-15	6.333E-15	1.224E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154508	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Beta	4.005E-14	1.581E-14	1.99E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154508	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Alpha	6.561E-15	8.001E-15	1.195E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154509	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Beta	5.696E-14	1.733E-14	1.97E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154509	SLAPS Loadout	09/26/13	Gross Alpha/Beta	Gross Alpha	9.011E-15	8.684E-15	1.183E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154510	SLAPS Loadout	09/30/13	Gross Alpha/Beta	Gross Beta	2.385E-14	1.471E-14	2.102E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154510	SLAPS Loadout	09/30/13	Gross Alpha/Beta	Gross Alpha	2.907E-15	7.061E-15	1.263E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154511	SLAPS Loadout	09/30/13	Gross Alpha/Beta	Gross Beta	2.471E-14	1.569E-14	2.258E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154511	SLAPS Loadout	09/30/13	Gross Alpha/Beta	Gross Alpha	1.033E-14	9.953E-15	1.356E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154512	SLAPS Loadout	10/01/13	Gross Alpha/Beta	Gross Beta	2.709E-14	1.72E-14	2.475E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154512	SLAPS Loadout	10/01/13	Gross Alpha/Beta	Gross Alpha	2.63E-16	7.011E-15	1.486E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154513	SLAPS Loadout	10/01/13	Gross Alpha/Beta	Gross Beta	3.679E-14	1.822E-14	2.463E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154513	SLAPS Loadout	10/01/13	Gross Alpha/Beta	Gross Alpha	3.405E-15	8.273E-15	1.479E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154514	SLAPS Loadout	10/02/13	Gross Alpha/Beta	Gross Beta	3.908E-14	1.59E-14	2.022E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154514	SLAPS Loadout	10/02/13	Gross Alpha/Beta	Gross Alpha	2.15E-16	5.727E-15	1.214E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154515	SLAPS Loadout	10/02/13	Gross Alpha/Beta	Gross Beta	2.056E-14	1.389E-14	2.026E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154515	SLAPS Loadout	10/02/13	Gross Alpha/Beta	Gross Alpha	2.801E-15	6.805E-15	1.217E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154516	SLAPS Loadout	10/03/13	Gross Alpha/Beta	Gross Beta	1.82E-14	1.317E-14	1.948E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154516	SLAPS Loadout	10/03/13	Gross Alpha/Beta	Gross Alpha	3.935E-15	6.997E-15	1.17E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154517	SLAPS Loadout	10/03/13	Gross Alpha/Beta	Gross Beta	2.809E-14	1.421E-14	1.933E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154517	SLAPS Loadout	10/03/13	Gross Alpha/Beta	Gross Alpha	2.06E-16	5.474E-15	1.161E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154518	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Alpha	4.85E-15	6.18E-15	9.859E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154518	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Beta	5.989E-15	1.916E-14	2.633E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154519	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Alpha	-2.134E-15	2.373E-15	9.859E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154519	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Beta	1.414E-14	1.978E-14	2.633E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA154520	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Alpha	-2.134E-15	2.373E-15	9.859E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154520	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Beta	8.953E-15	1.939E-14	2.633E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154521	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Alpha	1.98E-16	4.133E-15	1.005E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154521	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Beta	6.102E-15	1.952E-14	2.683E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154522	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Alpha	-9.88E-16	3.385E-15	1.005E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154522	SLAPS Loadout	10/07/13	Gross Alpha/Beta	Gross Beta	6.857E-15	1.958E-14	2.683E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154523	SLAPS Loadout	10/08/13	Gross Alpha/Beta	Gross Beta	2.432E-14	2.224E-14	2.872E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154523	SLAPS Loadout	10/08/13	Gross Alpha/Beta	Gross Alpha	1.481E-15	5.103E-15	1.076E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154524	SLAPS Loadout	10/09/13	Gross Alpha/Beta	Gross Alpha	-2.459E-15	8.424E-15	2.499E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154524	SLAPS Loadout	10/09/13	Gross Alpha/Beta	Gross Beta	1.706E-14	4.873E-14	6.675E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154525	SLAPS Loadout	10/10/13	Gross Alpha/Beta	Gross Alpha	9.478E-15	1.472E-14	2.535E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154525	SLAPS Loadout	10/10/13	Gross Alpha/Beta	Gross Beta	4.589E-14	5.158E-14	6.771E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154526	SLAPS Loadout	10/10/13	Gross Alpha/Beta	Gross Alpha	5.16E-16	1.079E-14	2.623E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154526	SLAPS Loadout	10/10/13	Gross Alpha/Beta	Gross Beta	3.564E-14	5.248E-14	7.004E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154527	SLAPS Loadout	10/14/13	Gross Alpha/Beta	Gross Beta	2.139E-14	1.232E-14	1.71E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154527	SLAPS Loadout	10/14/13	Gross Alpha/Beta	Gross Alpha	9.813E-15	8.332E-15	1.071E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154528	SLAPS Loadout	10/14/13	Gross Alpha/Beta	Gross Beta	2.066E-14	1.224E-14	1.71E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154528	SLAPS Loadout	10/14/13	Gross Alpha/Beta	Gross Alpha	3.984E-15	6.499E-15	1.071E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154529	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Beta	4.903E-14	2.208E-14	2.849E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154529	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Alpha	6.639E-15	1.083E-14	1.785E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154530	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Beta	5.449E-14	1.615E-14	1.766E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154530	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Alpha	8.931E-15	8.262E-15	1.107E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154531	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Beta	5.448E-14	1.6E-14	1.741E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154531	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Alpha	8.807E-15	8.148E-15	1.091E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154532	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Beta	4.903E-14	2.208E-14	2.849E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154532	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Alpha	-5.02E-15	5.168E-15	1.785E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154533	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Beta	2.35E-14	1.904E-14	2.849E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154533	SLAPS Loadout	10/15/13	Gross Alpha/Beta	Gross Alpha	6.639E-15	1.083E-14	1.785E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154534	SLAPS Loadout	10/16/13	Gross Alpha/Beta	Gross Alpha	2.87E-15	6.179E-15	1.091E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154534	SLAPS Loadout	10/16/13	Gross Alpha/Beta	Gross Beta	2.476E-15	9.995E-15	1.741E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154535	SLAPS Loadout	10/21/13	Gross Alpha/Beta	Gross Beta	3.105E-14	1.49E-14	1.895E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154535	SLAPS Loadout	10/21/13	Gross Alpha/Beta	Gross Alpha	2.98E-15	6.923E-15	1.133E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154536	SLAPS Loadout	10/22/13	Gross Alpha/Beta	Gross Beta	1.522E-14	1.233E-14	1.76E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154536	SLAPS Loadout	10/22/13	Gross Alpha/Beta	Gross Alpha	-1.813E-15	4.511E-15	1.052E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154537	SLAPS Loadout	10/22/13	Gross Alpha/Beta	Gross Beta	2.256E-14	1.398E-14	1.895E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154537	SLAPS Loadout	10/22/13	Gross Alpha/Beta	Gross Alpha	1.747E-15	6.469E-15	1.133E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154538	SLAPS Loadout	10/23/13	Gross Alpha/Beta	Gross Beta	2.082E-14	1.368E-14	1.877E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154538	SLAPS Loadout	10/23/13	Gross Alpha/Beta	Gross Alpha	5.09E-16	5.923E-15	1.122E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154539	SLAPS Loadout	10/23/13	Gross Alpha/Beta	Gross Beta	2.931E-14	1.637E-14	2.166E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154539	SLAPS Loadout	10/23/13	Gross Alpha/Beta	Gross Alpha	3.406E-15	7.912E-15	1.295E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154540	SLAPS Loadout	10/24/13	Gross Alpha/Beta	Gross Alpha	5.34E-16	6.22E-15	1.178E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154540	SLAPS Loadout	10/24/13	Gross Alpha/Beta	Gross Beta	4.212E-15	1.222E-14	1.971E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154541	SLAPS Loadout	10/24/13	Gross Alpha/Beta	Gross Beta	3.309E-14	1.558E-14	1.971E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154541	SLAPS Loadout	10/24/13	Gross Alpha/Beta	Gross Alpha	1.817E-15	6.728E-15	1.178E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA154542	SLAPS Loadout	10/28/13	Gross Alpha/Beta	Gross Beta	5.622E-14	2.423E-14	2.986E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154542	SLAPS Loadout	10/28/13	Gross Alpha/Beta	Gross Alpha	2.024E-14	1.549E-14	1.785E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154543	SLAPS Loadout	10/28/13	Gross Alpha/Beta	Gross Beta	6.095E-14	1.789E-14	1.913E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154543	SLAPS Loadout	10/28/13	Gross Alpha/Beta	Gross Alpha	1.795E-14	1.11E-14	1.144E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154544	SLAPS Loadout	10/29/13	Gross Alpha/Beta	Gross Beta	5.82E-14	1.664E-14	1.76E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154544	SLAPS Loadout	10/29/13	Gross Alpha/Beta	Gross Alpha	1.994E-14	1.096E-14	1.052E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154545	SLAPS Loadout	10/30/13	Gross Alpha/Beta	Gross Beta	5.219E-14	1.652E-14	1.825E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154545	SLAPS Loadout	10/30/13	Gross Alpha/Beta	Gross Alpha	5.245E-15	7.465E-15	1.091E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154546	SLAPS Loadout	10/30/13	Gross Alpha/Beta	Gross Beta	4.477E-14	1.688E-14	1.991E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154546	SLAPS Loadout	10/30/13	Gross Alpha/Beta	Gross Alpha	1.349E-14	1.033E-14	1.19E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154547	SLAPS Loadout	11/04/13	Gross Alpha/Beta	Gross Beta	4.367E-14	1.716E-14	2.053E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154547	SLAPS Loadout	11/04/13	Gross Alpha/Beta	Gross Alpha	5.57E-16	6.479E-15	1.228E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154548	SLAPS Loadout	11/06/13	Gross Alpha/Beta	Gross Beta	8.944E-14	4.108E-14	5.209E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154548	SLAPS Loadout	11/06/13	Gross Alpha/Beta	Gross Alpha	4.968E-14	3.287E-14	3.502E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154549	SLAPS Loadout	11/06/13	Gross Alpha/Beta	Gross Alpha	8.313E-15	2.307E-14	3.599E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154549	SLAPS Loadout	11/06/13	Gross Alpha/Beta	Gross Beta	-1.671E-15	3.072E-14	5.353E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154550	SLAPS Loadout	11/07/13	Gross Alpha/Beta	Gross Beta	2.99E-14	1.399E-14	1.785E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154550	SLAPS Loadout	11/07/13	Gross Alpha/Beta	Gross Alpha	3.96E-16	6.917E-15	1.2E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154551	SLAPS Loadout	11/11/13	Gross Alpha/Beta	Gross Beta	3.029E-14	1.538E-14	2.008E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154551	SLAPS Loadout	11/11/13	Gross Alpha/Beta	Gross Alpha	1.247E-14	1.117E-14	1.35E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154552	SLAPS Loadout	11/12/13	Gross Alpha/Beta	Gross Alpha	1.734E-14	2.1E-14	3.235E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154552	SLAPS Loadout	11/12/13	Gross Alpha/Beta	Gross Beta	1.636E-14	2.957E-14	5.101E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154553	SLAPS Loadout	11/12/13	Gross Alpha/Beta	Gross Alpha	9.855E-15	8.611E-15	1.156E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154553	SLAPS Loadout	11/12/13	Gross Alpha/Beta	Gross Beta	9.66E-15	1.111E-14	1.823E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154554	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Beta	2.307E-14	1.376E-14	1.994E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154554	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Alpha	1.211E-14	9.787E-15	1.264E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA154555	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Beta	2.444E-14	1.379E-14	1.969E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154555	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Alpha	5.377E-15	7.665E-15	1.249E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154556	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Alpha	1.403E-15	6.061E-15	1.229E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154556	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Beta	8.644E-15	1.158E-14	1.937E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154557	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Beta	2.614E-14	1.402E-14	1.973E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154557	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Alpha	5.388E-15	7.681E-15	1.251E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154558	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Beta	2.449E-14	1.283E-14	1.793E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154558	SLAPS Loadout	11/13/13	Gross Alpha/Beta	Gross Alpha	3.696E-15	6.553E-15	1.137E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154559	SLAPS Loadout	11/14/13	Gross Alpha/Beta	Gross Beta	2.242E-14	1.3E-14	1.869E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA154559	SLAPS Loadout	11/14/13	Gross Alpha/Beta	Gross Alpha	-1.146E-15	4.659E-15	1.185E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154560	SLAPS Loadout	11/14/13	Gross Alpha/Beta	Gross Beta	2.794E-14	1.368E-14	1.873E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA154560	SLAPS Loadout	11/14/13	Gross Alpha/Beta	Gross Alpha	6.367E-15	7.709E-15	1.188E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA154561	SLAPS Loadout	11/18/13	Gross Alpha/Beta	Gross Beta	3.952E-14	2.037E-14	2.849E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154561	SLAPS Loadout	11/18/13	Gross Alpha/Beta	Gross Alpha	9.439E-15	8.858E-15	1.068E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154562	SLAPS Loadout	11/18/13	Gross Alpha/Beta	Gross Beta	4.05E-14	2.017E-14	2.803E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154562	SLAPS Loadout	11/18/13	Gross Alpha/Beta	Gross Alpha	8.021E-15	8.334E-15	1.051E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154563	SLAPS Loadout	11/19/13	Gross Alpha/Beta	Gross Beta	3.338E-14	1.926E-14	2.748E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154563	SLAPS Loadout	11/19/13	Gross Alpha/Beta	Gross Alpha	6.621E-15	7.778E-15	1.03E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA154564	SLAPS Loadout	11/19/13	Gross Alpha/Beta	Gross Beta	3.18E-14	1.913E-14	2.748E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154564	SLAPS Loadout	11/19/13	Gross Alpha/Beta	Gross Alpha	4.138E-15	6.931E-15	1.03E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154565	SLAPS Loadout	11/20/13	Gross Alpha/Beta	Gross Beta	1.83E-14	1.791E-14	2.737E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154565	SLAPS Loadout	11/20/13	Gross Alpha/Beta	Gross Alpha	4.122E-15	6.904E-15	1.026E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154566	SLAPS Loadout	11/20/13	Gross Alpha/Beta	Gross Beta	3.053E-14	1.877E-14	2.705E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154566	SLAPS Loadout	11/20/13	Gross Alpha/Beta	Gross Alpha	8.963E-15	8.412E-15	1.014E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154567	SLAPS Loadout	11/21/13	Gross Alpha/Beta	Gross Alpha	1.149E-15	1.507E-14	2.86E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154567	SLAPS Loadout	11/21/13	Gross Alpha/Beta	Gross Beta	1.59E-14	4.673E-14	7.629E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154568	SLAPS Loadout	11/21/13	Gross Alpha/Beta	Gross Alpha	1.029E-14	2.298E-14	3.66E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154568	SLAPS Loadout	11/21/13	Gross Alpha/Beta	Gross Beta	3.999E-14	6.161E-14	9.762E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154569	SLAPS Loadout	11/25/13	Gross Alpha/Beta	Gross Beta	2.695E-14	1.866E-14	2.737E-14	µCi/mL	U	T04, T05	SLAPS (General Area)-Perimeter Air
SLA154569	SLAPS Loadout	11/25/13	Gross Alpha/Beta	Gross Alpha	5.359E-15	7.337E-15	1.026E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154570	SLAPS Loadout	11/25/13	Gross Alpha/Beta	Gross Alpha	7.594E-15	7.89E-15	9.949E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154570	SLAPS Loadout	11/25/13	Gross Alpha/Beta	Gross Beta	1.316E-14	1.696E-14	2.654E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154571	SLAPS Loadout	11/26/13	Gross Alpha/Beta	Gross Beta	2.771E-14	1.826E-14	2.659E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154571	SLAPS Loadout	11/26/13	Gross Alpha/Beta	Gross Alpha	5.206E-15	7.127E-15	9.968E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154572	SLAPS Loadout	11/26/13	Gross Alpha/Beta	Gross Beta	3.42E-14	1.861E-14	2.629E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154572	SLAPS Loadout	11/26/13	Gross Alpha/Beta	Gross Alpha	1.584E-15	5.711E-15	9.856E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154573	SLAPS Loadout	11/27/13	Gross Alpha/Beta	Gross Beta	3.987E-14	1.892E-14	2.605E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154573	SLAPS Loadout	11/27/13	Gross Alpha/Beta	Gross Alpha	6.276E-15	7.371E-15	9.764E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154574	SLAPS Loadout	11/27/13	Gross Alpha/Beta	Gross Beta	3.499E-14	1.904E-14	2.69E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154574	SLAPS Loadout	11/27/13	Gross Alpha/Beta	Gross Alpha	6.481E-15	7.613E-15	1.008E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154575	SLAPS Loadout	12/02/13	Gross Alpha/Beta	Gross Beta	3.745E-14	2.038E-14	2.878E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154575	SLAPS Loadout	12/02/13	Gross Alpha/Beta	Gross Alpha	8.236E-15	8.557E-15	1.079E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154576	SLAPS Loadout	12/02/13	Gross Alpha/Beta	Gross Beta	9.045E-14	2.504E-14	2.989E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154576	SLAPS Loadout	12/02/13	Gross Alpha/Beta	Gross Alpha	7.203E-15	8.46E-15	1.121E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154577	SLAPS Loadout	12/04/13	Gross Alpha/Beta	Gross Beta	3.137E-14	1.887E-14	2.711E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154577	SLAPS Loadout	12/04/13	Gross Alpha/Beta	Gross Alpha	6.531E-15	7.672E-15	1.016E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154578	SLAPS Loadout	12/04/13	Gross Alpha/Beta	Gross Beta	3.313E-14	1.874E-14	2.664E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154578	SLAPS Loadout	12/04/13	Gross Alpha/Beta	Gross Alpha	-8.02E-16	4.679E-15	9.987E-15	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154579	SLAPS Loadout	12/03/13	Gross Alpha/Beta	Gross Beta	5.448E-14	1.599E-14	1.793E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154579	SLAPS Loadout	12/03/13	Gross Alpha/Beta	Gross Alpha	1E-16	5.07E-15	1.137E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154580	SLAPS Loadout	12/03/13	Gross Alpha/Beta	Gross Beta	4.365E-14	1.502E-14	1.809E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154580	SLAPS Loadout	12/03/13	Gross Alpha/Beta	Gross Alpha	4.941E-15	7.043E-15	1.147E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154581	SLAPS Loadout	12/09/13	Gross Alpha/Beta	Gross Beta	4.47E-14	1.538E-14	1.853E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154581	SLAPS Loadout	12/09/13	Gross Alpha/Beta	Gross Alpha	-1.136E-15	4.618E-15	1.175E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154582	SLAPS Loadout	12/09/13	Gross Alpha/Beta	Gross Beta	6.03E-14	1.707E-14	1.88E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154582	SLAPS Loadout	12/09/13	Gross Alpha/Beta	Gross Alpha	1.362E-15	5.883E-15	1.192E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154583	SLAPS Loadout	12/10/13	Gross Alpha/Beta	Gross Beta	4.327E-14	1.567E-14	1.928E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154583	SLAPS Loadout	12/10/13	Gross Alpha/Beta	Gross Alpha	3.974E-15	7.047E-15	1.222E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154584	SLAPS Loadout	12/10/13	Gross Alpha/Beta	Gross Beta	4.898E-14	1.608E-14	1.899E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154584	SLAPS Loadout	12/10/13	Gross Alpha/Beta	Gross Alpha	5.185E-15	7.392E-15	1.204E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA154585	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Beta	5.693E-14	1.686E-14	1.899E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154585	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Alpha	3.915E-15	6.942E-15	1.204E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA154586	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Beta	3.695E-14	1.457E-14	1.853E-14	µCi/mL	=		SLAPS (General Area)-Perimeter Air
SLA154586	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Alpha	1.373E-14	9.748E-15	1.175E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154587	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Beta	1.118E-13	6.151E-14	8.718E-14	µCi/mL	J	T04	SLAPS (General Area)-Perimeter Air
SLA154587	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Alpha	2.963E-14	3.588E-14	5.528E-14	µCi/mL	UJ	T06	SLAPS (General Area)-Perimeter Air
SLA167137	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Alpha	2.605E-14	3.172E-14	4.744E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167137	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Beta	6.289E-14	7.493E-14	1.154E-13	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167138	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Alpha	9.968E-15	2.581E-14	4.784E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167138	SLAPS Loadout	12/11/13	Gross Alpha/Beta	Gross Beta	7.381E-14	7.652E-14	1.164E-13	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167139	SLAPS Loadout	12/12/13	Gross Alpha/Beta	Gross Beta	2.285E-14	1.894E-14	2.814E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167139	SLAPS Loadout	12/12/13	Gross Alpha/Beta	Gross Alpha	5.037E-15	7.267E-15	1.156E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167140	SLAPS Loadout	12/12/13	Gross Alpha/Beta	Gross Beta	2.817E-14	1.959E-14	2.843E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167140	SLAPS Loadout	12/12/13	Gross Alpha/Beta	Gross Alpha	2.434E-15	6.303E-15	1.168E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167141	SLAPS Loadout	12/16/13	Gross Alpha/Beta	Gross Beta	7.714E-14	6.611E-14	9.858E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167141	SLAPS Loadout	12/16/13	Gross Alpha/Beta	Gross Alpha	3.836E-15	1.981E-14	4.051E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167142	SLAPS Loadout	12/16/13	Gross Alpha/Beta	Gross Beta	5.843E-14	5.184E-14	7.762E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167142	SLAPS Loadout	12/16/13	Gross Alpha/Beta	Gross Alpha	1.39E-14	2.005E-14	3.19E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167143	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Beta	5.546E-14	2.066E-14	2.653E-14	µCi/mL	=		SLAPS General Air Monitoring
SLA167143	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Alpha	3.511E-15	6.385E-15	1.09E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167144	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Beta	9.178E-14	2.49E-14	2.905E-14	µCi/mL	=		SLAPS General Air Monitoring
SLA167144	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Alpha	6.556E-15	7.981E-15	1.194E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167145	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Beta	4.988E-14	4.003E-14	5.924E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167145	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Alpha	1.06E-14	1.53E-14	2.434E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167146	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Alpha	-5.993E-15	7.074E-15	2.434E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167146	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Beta	1.115E-14	3.646E-14	5.924E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167147	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Beta	5.444E-14	3.997E-14	5.847E-14	µCi/mL	U	T04, T05	SLAPS General Air Monitoring
SLA167147	SLAPS Loadout	12/17/13	Gross Alpha/Beta	Gross Alpha	5.005E-15	1.296E-14	2.403E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167148	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Alpha	-1.483E-15	4.125E-15	1.119E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167148	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Beta	3.506E-15	1.66E-14	2.723E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167149	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Alpha	6.311E-15	7.684E-15	1.149E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167149	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Beta	2.77E-16	1.672E-14	2.796E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167150	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Alpha	2.551E-15	1.318E-14	2.694E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167150	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Beta	4.156E-14	4.309E-14	6.556E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167151	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Alpha	2.576E-15	1.331E-14	2.721E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167151	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Beta	-5.246E-15	3.9E-14	6.621E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167152	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Alpha	-5.08E-16	1.161E-14	2.681E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167152	SLAPS Loadout	12/18/13	Gross Alpha/Beta	Gross Beta	1.422E-14	4.035E-14	6.525E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167153	SLAPS Loadout	12/19/13	Gross Alpha/Beta	Gross Beta	7.016E-14	2.31E-14	2.868E-14	µCi/mL	=		SLAPS General Air Monitoring
SLA167153	SLAPS Loadout	12/19/13	Gross Alpha/Beta	Gross Alpha	3.794E-15	6.901E-15	1.178E-14	µCi/mL	UJ	T06	SLAPS General Air Monitoring
SLA167154	SLAPS Loadout	12/23/13	Gross Alpha/Beta	Gross Alpha	2.613E-15	1.056E-14	1.923E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167154	SLAPS Loadout	12/23/13	Gross Alpha/Beta	Gross Beta	1.885E-14	3.337E-14	5.745E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167155	SLAPS Loadout	12/23/13	Gross Alpha/Beta	Gross Alpha	1.411E-14	1.159E-14	1.352E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA167155	SLAPS Loadout	12/23/13	Gross Alpha/Beta	Gross Beta	2.538E-14	1.43E-14	1.948E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA167156	SLAPS Loadout	12/24/13	Gross Alpha/Beta	Gross Beta	4.6E-14	1.74E-14	2.108E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA167156	SLAPS Loadout	12/24/13	Gross Alpha/Beta	Gross Alpha	7.185E-15	1.067E-14	1.463E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SLA167157	SLAPS Loadout	12/24/13	Gross Alpha/Beta	Gross Beta	4.421E-14	1.769E-14	2.186E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA167157	SLAPS Loadout	12/24/13	Gross Alpha/Beta	Gross Alpha	1.025E-14	1.174E-14	1.517E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167158	SLAPS Loadout	12/26/13	Gross Alpha/Beta	Gross Beta	2.657E-14	1.497E-14	2.039E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA167158	SLAPS Loadout	12/26/13	Gross Alpha/Beta	Gross Alpha	4.345E-15	9.637E-15	1.415E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167159	SLAPS Loadout	12/26/13	Gross Alpha/Beta	Gross Beta	3.357E-14	1.59E-14	2.068E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA167159	SLAPS Loadout	12/26/13	Gross Alpha/Beta	Gross Alpha	4.407E-15	9.776E-15	1.436E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167160	SLAPS Loadout	12/30/13	Gross Alpha/Beta	Gross Beta	2.788E-14	1.464E-14	1.959E-14	µCi/mL	J	T04	SLAPS Loadout (General Area)-Perimeter Air
SLA167160	SLAPS Loadout	12/30/13	Gross Alpha/Beta	Gross Alpha	-2.087E-15	7.374E-15	1.36E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167161	SLAPS Loadout	12/30/13	Gross Alpha/Beta	Gross Alpha	-3.32E-15	6.895E-15	1.352E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167161	SLAPS Loadout	12/30/13	Gross Alpha/Beta	Gross Beta	9.022E-15	1.238E-14	1.948E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167162	SLAPS Loadout	12/31/13	Gross Alpha/Beta	Gross Beta	1.734E-14	1.494E-14	2.215E-14	µCi/mL	U	T04, T05	SLAPS Loadout (General Area)-Perimeter Air
SLA167162	SLAPS Loadout	12/31/13	Gross Alpha/Beta	Gross Alpha	-2.359E-15	8.335E-15	1.537E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SLA167163	SLAPS Loadout	12/31/13	Gross Alpha/Beta	Gross Beta	3.532E-14	1.583E-14	2.027E-14	µCi/mL	=		SLAPS Loadout (General Area)-Perimeter Air
SLA167163	SLAPS Loadout	12/31/13	Gross Alpha/Beta	Gross Alpha	-8.64E-16	8.056E-15	1.407E-14	µCi/mL	UJ	T06	SLAPS Loadout (General Area)-Perimeter Air
SVP145400	IA-09	01/02/13	Gross Alpha/Beta	Gross Beta	7.052E-14	5.278E-14	6.995E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP145400	IA-09	01/02/13	Gross Alpha/Beta	Gross Alpha	3.666E-15	1.685E-14	2.957E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP145405	IA-09	01/03/13	Gross Alpha/Beta	Gross Beta	4.813E-14	2.193E-14	2.703E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP145405	IA-09	01/03/13	Gross Alpha/Beta	Gross Alpha	2.02E-16	6.041E-15	1.143E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP145410	IA-09	01/08/13	Gross Alpha/Beta	Gross Beta	7.669E-14	4.368E-14	6.024E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP145410	IA-09	01/08/13	Gross Alpha/Beta	Gross Alpha	-1.594E-14	5.733E-14	3.521E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP145411	IA-09	01/07/13	Gross Alpha/Beta	Gross Beta	7.137E-14	2.261E-14	2.744E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP145411	IA-09	01/07/13	Gross Alpha/Beta	Gross Alpha	-4.771E-15	2.634E-14	1.604E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151761	IA-09	01/31/13	Gross Alpha/Beta	Gross Beta	2.797E-14	1.333E-14	1.777E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP151761	IA-09	01/31/13	Gross Alpha/Beta	Gross Alpha	5.016E-15	6.946E-15	9.895E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151762	IA-09	02/05/13	Gross Alpha/Beta	Gross Beta	2.777E-14	1.789E-14	2.518E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP151762	IA-09	02/05/13	Gross Alpha/Beta	Gross Alpha	3.809E-15	7.92E-15	9.483E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151763	IA-09	02/06/13	Gross Alpha/Beta	Gross Alpha	3.676E-15	7.642E-15	9.15E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151763	IA-09	02/06/13	Gross Alpha/Beta	Gross Beta	4.329E-15	1.532E-14	2.43E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151764	IA-09	02/07/13	Gross Alpha/Beta	Gross Beta	4.694E-14	2.614E-14	3.597E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP151764	IA-09	02/07/13	Gross Alpha/Beta	Gross Alpha	2.177E-15	1.033E-14	1.355E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151765	IA-09	02/11/13	Gross Alpha/Beta	Gross Alpha	7.08E-16	5.602E-15	1.202E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151765	IA-09	02/11/13	Gross Alpha/Beta	Gross Beta	9.311E-15	1.284E-14	1.896E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151766	IA-09	02/12/13	Gross Alpha/Beta	Gross Alpha	-5.21E-16	5.197E-15	1.237E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151766	IA-09	02/12/13	Gross Alpha/Beta	Gross Beta	1.276E-14	1.36E-14	1.952E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151767	IA-09	02/13/13	Gross Alpha/Beta	Gross Beta	2.05E-14	1.484E-14	2.011E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP151767	IA-09	02/13/13	Gross Alpha/Beta	Gross Alpha	-1.824E-15	4.695E-15	1.275E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151768	IA-09	02/14/13	Gross Alpha/Beta	Gross Alpha	-1.72E-15	4.427E-15	1.202E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151768	IA-09	02/14/13	Gross Alpha/Beta	Gross Beta	6.999E-15	1.256E-14	1.896E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151769	IA-09	02/18/13	Gross Alpha/Beta	Gross Alpha	-8.031E-15	1.468E-14	3.974E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151769	IA-09	02/18/13	Gross Alpha/Beta	Gross Beta	2.112E-14	5.509E-14	9.245E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151770	IA-09	02/19/13	Gross Alpha/Beta	Gross Alpha	-2.339E-15	4.275E-15	1.157E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151770	IA-09	02/19/13	Gross Alpha/Beta	Gross Beta	1.625E-14	1.7E-14	2.693E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151771	IA-09	02/20/13	Gross Alpha/Beta	Gross Alpha	1.335E-15	6.07E-15	1.169E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151771	IA-09	02/20/13	Gross Alpha/Beta	Gross Beta	1.406E-14	1.695E-14	2.719E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SVP151772	IA-09	02/27/13	Gross Alpha/Beta	Gross Beta	4.812E-14	1.815E-14	1.94E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP151772	IA-09	02/27/13	Gross Alpha/Beta	Gross Alpha	2.083E-15	1.381E-14	1.415E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151773	IA-09	02/28/13	Gross Alpha/Beta	Gross Beta	4.11E-14	2.044E-14	2.355E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP151773	IA-09	02/28/13	Gross Alpha/Beta	Gross Alpha	-2.023E-15	1.592E-14	1.718E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151774	IA-09	03/04/13	Gross Alpha/Beta	Gross Alpha	-3.43E-16	7.53E-15	1.446E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151774	IA-09	03/04/13	Gross Alpha/Beta	Gross Beta	1.559E-14	1.565E-14	2.145E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151775	IA-09	03/07/13	Gross Alpha/Beta	Gross Beta	2.859E-14	1.66E-14	2.078E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP151775	IA-09	03/07/13	Gross Alpha/Beta	Gross Alpha	2.323E-15	8.205E-15	1.401E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151776	IA-09	03/11/13	Gross Alpha/Beta	Gross Alpha	-5.24E-16	9.901E-15	2.046E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151776	IA-09	03/11/13	Gross Alpha/Beta	Gross Beta	3.39E-14	3.624E-14	4.779E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151777	IA-09	03/11/13	Gross Alpha/Beta	Gross Alpha	-2.773E-15	4.668E-15	1.204E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP151777	IA-09	03/11/13	Gross Alpha/Beta	Gross Beta	-3.596E-15	1.951E-14	2.811E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154892	VP-16	05/20/13	Gross Alpha/Beta	Gross Alpha	2.73E-15	8.74E-15	1.459E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154892	VP-16	05/20/13	Gross Alpha/Beta	Gross Beta	1.618E-14	2.755E-14	4.505E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154893	VP-16	05/21/13	Gross Alpha/Beta	Gross Alpha	1.862E-15	5.963E-15	9.954E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154893	VP-16	05/21/13	Gross Alpha/Beta	Gross Beta	1.726E-14	1.937E-14	3.074E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154894	IA-10	05/29/13	Gross Alpha/Beta	Gross Alpha	4.339E-15	8.769E-15	1.325E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154894	IA-10	05/29/13	Gross Alpha/Beta	Gross Beta	1.707E-14	2.524E-14	4.092E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154905	IA-09	06/05/13	Gross Alpha/Beta	Gross Alpha	-2.18E-16	4E-15	1.014E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154905	IA-09	06/05/13	Gross Alpha/Beta	Gross Beta	7.224E-15	1.77E-14	2.938E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154906	IA-09	06/06/13	Gross Alpha/Beta	Gross Alpha	8.573E-15	7.677E-15	9.718E-15	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154906	IA-09	06/06/13	Gross Alpha/Beta	Gross Beta	5.324E-15	1.681E-14	2.815E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154907	IA-09	06/10/13	Gross Alpha/Beta	Gross Alpha	3.707E-14	4.87E-14	7.491E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154907	IA-09	06/10/13	Gross Alpha/Beta	Gross Beta	7.797E-14	1.33E-13	2.17E-13	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154908	IA-09	06/10/13	Gross Alpha/Beta	Gross Alpha	2.037E-14	2.019E-14	2.705E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154908	IA-09	06/10/13	Gross Alpha/Beta	Gross Beta	5.038E-14	5.004E-14	7.836E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154909	IA-09	06/11/13	Gross Alpha/Beta	Gross Beta	2.294E-14	1.844E-14	2.821E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154909	IA-09	06/11/13	Gross Alpha/Beta	Gross Alpha	1.048E-15	4.59E-15	9.738E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154910	IA-09	06/12/13	Gross Alpha/Beta	Gross Beta	2.816E-14	2.072E-14	3.134E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154910	IA-09	06/12/13	Gross Alpha/Beta	Gross Alpha	3.957E-15	6.454E-15	1.082E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154911	IA-09	06/13/13	Gross Alpha/Beta	Gross Beta	3.402E-14	1.971E-14	2.878E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP154911	IA-09	06/13/13	Gross Alpha/Beta	Gross Alpha	4.917E-15	6.461E-15	9.936E-15	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154912	IA-09	06/13/13	Gross Alpha/Beta	Gross Beta	5.398E-14	2.415E-14	3.358E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154912	IA-09	06/13/13	Gross Alpha/Beta	Gross Alpha	-2.49E-16	4.572E-15	1.159E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154913	IA-09	06/18/13	Gross Alpha/Beta	Gross Alpha	4.029E-15	1.766E-14	3.745E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154913	IA-09	06/18/13	Gross Alpha/Beta	Gross Beta	6.668E-14	6.901E-14	1.085E-13	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154941	IA-09	07/31/13	Gross Alpha/Beta	Gross Beta	3.859E-14	2.109E-14	2.961E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154941	IA-09	07/31/13	Gross Alpha/Beta	Gross Alpha	2.193E-15	1.076E-14	1.924E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154942	IA-09	08/01/13	Gross Alpha/Beta	Gross Beta	2.697E-14	1.638E-14	2.362E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154942	IA-09	08/01/13	Gross Alpha/Beta	Gross Alpha	1.749E-15	8.58E-15	1.535E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154943	IA-09	08/05/13	Gross Alpha/Beta	Gross Beta	4.292E-14	1.698E-14	2.159E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154943	IA-09	08/05/13	Gross Alpha/Beta	Gross Alpha	7.081E-15	9.57E-15	1.403E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154944	IA-09	08/06/13	Gross Alpha/Beta	Gross Beta	2.823E-14	1.379E-14	1.876E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154944	IA-09	08/06/13	Gross Alpha/Beta	Gross Alpha	1.39E-15	6.816E-15	1.219E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SVP154945	IA-09	08/07/13	Gross Alpha/Beta	Gross Alpha	5.397E-15	8.665E-15	1.326E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154945	IA-09	08/07/13	Gross Alpha/Beta	Gross Beta	9.319E-15	1.241E-14	2.04E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154946	IA-09	08/08/13	Gross Alpha/Beta	Gross Alpha	7.87E-16	2.531E-14	4.831E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154946	IA-09	08/08/13	Gross Alpha/Beta	Gross Beta	3.396E-14	4.523E-14	7.435E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154947	IA-09	08/12/13	Gross Alpha/Beta	Gross Beta	6.833E-14	4.545E-14	6.691E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154947	IA-09	08/12/13	Gross Alpha/Beta	Gross Alpha	1.345E-14	2.712E-14	4.348E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154948	IA-09	08/13/13	Gross Alpha/Beta	Gross Alpha	1.96E-14	2.649E-14	3.882E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154948	IA-09	08/13/13	Gross Alpha/Beta	Gross Beta	3.452E-14	3.729E-14	5.974E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154949	IA-09	08/15/13	Gross Alpha/Beta	Gross Alpha	1.663E-15	8.158E-15	1.459E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154949	IA-09	08/15/13	Gross Alpha/Beta	Gross Beta	1.388E-14	1.413E-14	2.245E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154950	IA-09	08/19/13	Gross Alpha/Beta	Gross Beta	2.557E-14	1.47E-14	2.091E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154950	IA-09	08/19/13	Gross Alpha/Beta	Gross Alpha	4.204E-15	8.475E-15	1.359E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154951	IA-09	08/20/13	Gross Alpha/Beta	Gross Beta	4.374E-14	1.757E-14	2.245E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154951	IA-09	08/20/13	Gross Alpha/Beta	Gross Alpha	4.515E-15	9.101E-15	1.459E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154952	IA-09	08/21/13	Gross Alpha/Beta	Gross Beta	4.333E-14	1.689E-14	2.136E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154952	IA-09	08/21/13	Gross Alpha/Beta	Gross Alpha	8.362E-15	9.85E-15	1.388E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154953	IA-09	08/22/13	Gross Alpha/Beta	Gross Beta	5.002E-14	1.916E-14	2.373E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154953	IA-09	08/22/13	Gross Alpha/Beta	Gross Alpha	8.972E-15	1.188E-14	1.557E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154954	IA-09	08/26/13	Gross Alpha/Beta	Gross Beta	3.901E-14	1.697E-14	2.199E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154954	IA-09	08/26/13	Gross Alpha/Beta	Gross Alpha	2.446E-15	9.315E-15	1.443E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154955	IA-09	08/27/13	Gross Alpha/Beta	Gross Beta	3.107E-14	1.895E-14	2.707E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP154955	IA-09	08/27/13	Gross Alpha/Beta	Gross Alpha	1.024E-14	1.355E-14	1.776E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154956	IA-09	08/28/13	Gross Alpha/Beta	Gross Beta	1.917E-14	1.429E-14	2.135E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154956	IA-09	08/28/13	Gross Alpha/Beta	Gross Alpha	6.65E-15	1.031E-14	1.401E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154957	IA-09	08/28/13	Gross Alpha/Beta	Gross Beta	2.09E-14	1.448E-14	2.131E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154957	IA-09	08/28/13	Gross Alpha/Beta	Gross Alpha	3.792E-15	9.463E-15	1.398E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154958	IA-09	09/03/13	Gross Alpha/Beta	Gross Beta	1.585E-14	1.405E-14	2.169E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154958	IA-09	09/03/13	Gross Alpha/Beta	Gross Alpha	-1.93E-15	7.7E-15	1.424E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154959	IA-09	09/04/13	Gross Alpha/Beta	Gross Beta	2.048E-14	1.612E-14	2.293E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154959	IA-09	09/04/13	Gross Alpha/Beta	Gross Alpha	1.488E-15	7.266E-15	1.422E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154960	IA-09	09/05/13	Gross Alpha/Beta	Gross Beta	2.903E-14	2.285E-14	3.25E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154960	IA-09	09/05/13	Gross Alpha/Beta	Gross Alpha	6.328E-15	1.191E-14	2.016E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154961	IA-09	09/09/13	Gross Alpha/Beta	Gross Beta	2.715E-14	2.138E-14	3.04E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154961	IA-09	09/09/13	Gross Alpha/Beta	Gross Alpha	-1.973E-15	7.856E-15	1.885E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154962	IA-09	09/10/13	Gross Alpha/Beta	Gross Beta	5.539E-14	1.92E-14	2.201E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154962	IA-09	09/10/13	Gross Alpha/Beta	Gross Alpha	1.143E-14	1.028E-14	1.365E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154963	IA-09	09/11/13	Gross Alpha/Beta	Gross Beta	6.976E-14	2.753E-14	3.305E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154963	IA-09	09/11/13	Gross Alpha/Beta	Gross Alpha	0	9.556E-15	2.049E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154964	IA-09	09/12/13	Gross Alpha/Beta	Gross Beta	5.714E-14	2.358E-14	2.872E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154964	IA-09	09/12/13	Gross Alpha/Beta	Gross Alpha	9.321E-15	1.177E-14	1.781E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154965	IA-09	09/16/13	Gross Alpha/Beta	Gross Beta	3.665E-14	1.88E-14	2.44E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP154965	IA-09	09/16/13	Gross Alpha/Beta	Gross Alpha	1.583E-15	7.733E-15	1.513E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154966	IA-09	09/17/13	Gross Alpha/Beta	Gross Beta	4.764E-14	1.936E-14	2.347E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154966	IA-09	09/17/13	Gross Alpha/Beta	Gross Alpha	4.57E-15	8.596E-15	1.455E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SVP154967	IA-09	09/18/13	Gross Alpha/Beta	Gross Beta	5.418E-14	2.138E-14	2.567E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154967	IA-09	09/18/13	Gross Alpha/Beta	Gross Alpha	3.331E-15	8.79E-15	1.591E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154968	IA-09	09/19/13	Gross Alpha/Beta	Gross Beta	7.377E-14	2.133E-14	2.272E-14	µCi/mL	=		North County Air (General Area Air)-Environmental Monitoring
SVP154968	IA-09	09/19/13	Gross Alpha/Beta	Gross Alpha	1.474E-15	7.2E-15	1.409E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154969	IA-09	09/23/13	Gross Alpha/Beta	Gross Beta	3.619E-14	2.647E-14	3.715E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154969	IA-09	09/23/13	Gross Alpha/Beta	Gross Alpha	2.411E-15	1.177E-14	2.303E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154970	IA-09	09/24/13	Gross Alpha/Beta	Gross Alpha	5.7E-15	1.504E-14	2.723E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154970	IA-09	09/24/13	Gross Alpha/Beta	Gross Beta	2.853E-14	2.961E-14	4.392E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154971	IA-09	09/30/13	Gross Alpha/Beta	Gross Alpha	2.937E-15	6.713E-15	1.268E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154971	IA-09	09/30/13	Gross Alpha/Beta	Gross Beta	2.205E-14	2.324E-14	3.412E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154972	IA-09	10/01/13	Gross Alpha/Beta	Gross Alpha	6.285E-14	8.451E-14	1.357E-13	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154972	IA-09	10/01/13	Gross Alpha/Beta	Gross Beta	7.585E-14	2.354E-13	3.651E-13	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154973	IA-09	10/02/13	Gross Alpha/Beta	Gross Alpha	2.095E-14	2.817E-14	4.524E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154973	IA-09	10/02/13	Gross Alpha/Beta	Gross Beta	-3.14E-14	7.348E-14	1.217E-13	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154974	IA-09	10/03/13	Gross Alpha/Beta	Gross Alpha	1.533E-14	1.76E-14	2.648E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154974	IA-09	10/03/13	Gross Alpha/Beta	Gross Beta	2.456E-14	4.675E-14	7.125E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154975	IA-09	10/22/13	Gross Alpha/Beta	Gross Beta	2.635E-14	1.681E-14	2.292E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154975	IA-09	10/22/13	Gross Alpha/Beta	Gross Alpha	5.095E-15	8.888E-15	1.37E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154976	IA-09	10/23/13	Gross Alpha/Beta	Gross Beta	4.599E-14	2.568E-14	3.398E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154976	IA-09	10/23/13	Gross Alpha/Beta	Gross Alpha	3.133E-15	1.16E-14	2.032E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154977	IA-09	10/24/13	Gross Alpha/Beta	Gross Alpha	6.36E-16	7.404E-15	1.403E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154977	IA-09	10/24/13	Gross Alpha/Beta	Gross Beta	7.879E-15	1.492E-14	2.346E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154978	IA-09	10/30/13	Gross Alpha/Beta	Gross Beta	2.985E-14	1.752E-14	2.346E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154978	IA-09	10/30/13	Gross Alpha/Beta	Gross Alpha	3.69E-15	8.572E-15	1.403E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP154979	IA-09	11/14/13	Gross Alpha/Beta	Gross Beta	2.372E-14	1.888E-14	2.82E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154979	IA-09	11/14/13	Gross Alpha/Beta	Gross Alpha	4.247E-15	7.113E-15	1.057E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154980	IA-09	11/18/13	Gross Alpha/Beta	Gross Alpha	1.017E-14	9.54E-15	1.15E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154980	IA-09	11/18/13	Gross Alpha/Beta	Gross Beta	2.757E-14	2.069E-14	3.068E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154981	IA-09	11/19/13	Gross Alpha/Beta	Gross Beta	3.407E-14	2.245E-14	3.269E-14	µCi/mL	J	T04	North County Air (General Area Air)-Environmental Monitoring
SVP154981	IA-09	11/19/13	Gross Alpha/Beta	Gross Alpha	6.4E-15	8.763E-15	1.226E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154982	IA-09	11/20/13	Gross Alpha/Beta	Gross Beta	2.34E-14	2.204E-14	3.356E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154982	IA-09	11/20/13	Gross Alpha/Beta	Gross Alpha	3.538E-15	7.898E-15	1.258E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154983	IA-09	11/25/13	Gross Alpha/Beta	Gross Alpha	1.752E-15	6.318E-15	1.09E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154983	IA-09	11/25/13	Gross Alpha/Beta	Gross Beta	1.359E-14	1.851E-14	2.908E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP154984	IA-09	11/26/13	Gross Alpha/Beta	Gross Beta	2.293E-14	2.244E-14	3.43E-14	µCi/mL	U	T04, T05	North County Air (General Area Air)-Environmental Monitoring
SVP154984	IA-09	11/26/13	Gross Alpha/Beta	Gross Alpha	6.715E-15	9.194E-15	1.286E-14	µCi/mL	UJ	T06	North County Air (General Area Air)-Environmental Monitoring
SVP166420	IA-09	11/27/13	Gross Alpha/Beta	Gross Alpha	5.066E-15	8.484E-15	1.261E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166420	IA-09	11/27/13	Gross Alpha/Beta	Gross Beta	1.281E-14	2.114E-14	3.364E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166421	IA-09	12/02/13	Gross Alpha/Beta	Gross Beta	6.648E-14	2.606E-14	3.439E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166421	IA-09	12/02/13	Gross Alpha/Beta	Gross Alpha	1.45E-14	1.158E-14	1.289E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166422	IA-09	12/03/13	Gross Alpha/Beta	Gross Beta	5.699E-14	1.915E-14	2.283E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166422	IA-09	12/03/13	Gross Alpha/Beta	Gross Alpha	1.082E-14	1.034E-14	1.448E-14	µCi/mL	U	T04, T05	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166423	IA-09	12/04/13	Gross Alpha/Beta	Gross Beta	4.643E-14	1.704E-14	2.108E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166423	IA-09	12/04/13	Gross Alpha/Beta	Gross Alpha	4.346E-15	7.705E-15	1.337E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air

Table B-2. SLAPS Perimeter Air Data Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
SVP166424	IA-09	12/09/13	Gross Alpha/Beta	Gross Beta	5.939E-14	1.908E-14	2.23E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166424	IA-09	12/09/13	Gross Alpha/Beta	Gross Alpha	1.206E-14	1.053E-14	1.414E-14	µCi/mL	U	T04, T05	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166425	IA-09	12/10/13	Gross Alpha/Beta	Gross Beta	5.988E-14	1.826E-14	2.085E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166425	IA-09	12/10/13	Gross Alpha/Beta	Gross Alpha	2.904E-15	7.093E-15	1.322E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166426	IA-09	12/12/13	Gross Alpha/Beta	Gross Beta	2.238E-14	1.418E-14	2.085E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166426	IA-09	12/12/13	Gross Alpha/Beta	Gross Alpha	4.298E-15	7.621E-15	1.322E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166427	Ballfields	12/11/13	Gross Alpha/Beta	Gross Alpha	9.123E-15	1.316E-14	2.094E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166427	Ballfields	12/11/13	Gross Alpha/Beta	Gross Beta	2.928E-14	3.322E-14	5.097E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166428	Ballfields	12/16/13	Gross Alpha/Beta	Gross Beta	1.246E-13	6.412E-14	8.856E-14	µCi/mL	J	T04	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166428	Ballfields	12/16/13	Gross Alpha/Beta	Gross Alpha	1.585E-14	2.287E-14	3.639E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166429	Ballfields	12/23/13	Gross Alpha/Beta	Gross Beta	5.426E-14	4.992E-14	7.503E-14	µCi/mL	U	T04, T05	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166429	Ballfields	12/23/13	Gross Alpha/Beta	Gross Alpha	-4.088E-15	1.137E-14	3.083E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166430	Ballfields	12/24/13	Gross Alpha/Beta	Gross Beta	5.789E-14	2.542E-14	3.398E-14	µCi/mL	=		IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166430	Ballfields	12/24/13	Gross Alpha/Beta	Gross Alpha	4.496E-15	8.176E-15	1.396E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166431	Ballfields	12/26/13	Gross Alpha/Beta	Gross Beta	2.13E-14	1.766E-14	2.623E-14	µCi/mL	U	T04, T05	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166431	Ballfields	12/26/13	Gross Alpha/Beta	Gross Alpha	7.144E-15	7.616E-15	1.078E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166432	Ballfields	12/30/13	Gross Alpha/Beta	Gross Alpha	2.569E-15	6.653E-15	1.233E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air
SVP166432	Ballfields	12/30/13	Gross Alpha/Beta	Gross Beta	1.903E-14	1.973E-14	3.001E-14	µCi/mL	UJ	T06	IA-09 (Ballfields)(General Area)-Perimeter Air

Table B-3. NC Sites External Gamma Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
HIS151665	BA-1	04/01/13	Radiological	External gamma radiation	18.3	0	0.1	mrem	J		HISS Air (TLDs)-Environmental Monitoring
HIS155683	BA-1	07/09/13	Radiological	External gamma radiation	18.9	0	0.1	mrem	J		HISS Air (TLDs)-Environmental Monitoring
HIS155684	BA-1	10/01/13	Radiological	External gamma radiation	22	0	0.1	mrem	J		HISS Air (TLDs)-Environmental Monitoring
HIS167397	BA-1	01/10/14	Radiological	External gamma radiation	21.1	0	0.1	mrem	J		HISS Air (TLDs)-Environmental Monitoring
SLA151652	PA-1	04/01/13	Radiological	External gamma radiation	18.9	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155693	PA-1	07/09/13	Radiological	External gamma radiation	19.7	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155697	PA-1	10/01/13	Radiological	External gamma radiation	18	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA167401	PA-1	01/10/14	Radiological	External gamma radiation	20.8	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA151653	PA-2	04/01/13	Radiological	External gamma radiation	19.9	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155694	PA-2	07/09/13	Radiological	External gamma radiation	24.3	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155698	PA-2	10/01/13	Radiological	External gamma radiation	21.3	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA167402	PA-2	01/10/14	Radiological	External gamma radiation	24.4	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA151653-1	PA-2dup	04/01/13	Radiological	External gamma radiation	21	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155694-1	PA-2dup	07/09/13	Radiological	External gamma radiation	22.1	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155698-1	PA-2dup	10/01/13	Radiological	External gamma radiation	21.6	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA167402-1	PA-2dup	01/10/14	Radiological	External gamma radiation	24.7	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA151654	PA-3	04/01/13	Radiological	External gamma radiation	18	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155695	PA-3	07/09/13	Radiological	External gamma radiation	19.8	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155699	PA-3	10/01/13	Radiological	External gamma radiation	20.7	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA167403	PA-3	01/10/14	Radiological	External gamma radiation	21.1	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA151655	PA-4	04/01/13	Radiological	External gamma radiation	19.6	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155696	PA-4	07/09/13	Radiological	External gamma radiation	21.9	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA155700	PA-4	10/01/13	Radiological	External gamma radiation	20	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring
SLA167404	PA-4	01/10/14	Radiological	External gamma radiation	22.4	0	0.1	mrem	J		SLAPS Air (TLDs)-Environmental Monitoring

Table B-4. NC Sites Radon-222 Results for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code	Sampling Event Name
HIS151617	BA-1	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167325	BA-1	01/10/14	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
SLA151644	PA-1	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA167369	PA-1	01/10/14	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA151645	PA-2	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA167370	PA-2	01/10/14	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA151645-1	PA-2dup	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA167370-1	PA-2dup	01/10/14	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA151646	PA-3	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA167371	PA-3	01/10/14	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
SLA151647	PA-4	07/09/13	Radiological	Radon-222	0.2	0	0.2	pCi/L	UJ	Y01	SLAPS Air (Alpha Tracks)-Environmental Monitoring
HIS151618	HF-1	07/09/13	Radiological	Radon-222	1.6	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151619	HF-2	07/09/13	Radiological	Radon-222	4.4	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151620	HF-3	07/09/13	Radiological	Radon-222	0.7	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151623	HF-6	07/09/13	Radiological	Radon-222	0.6	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151624	HF-7	07/09/13	Radiological	Radon-222	0.9	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151625	HF-8	07/09/13	Radiological	Radon-222	0.7	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151626	HF-9	07/09/13	Radiological	Radon-222	0.7	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS151627	HF-10	07/09/13	Radiological	Radon-222	0.7	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167326	HF-1	01/10/14	Radiological	Radon-222	1.3	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167327	HF-2	01/10/14	Radiological	Radon-222	4.5	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167328	HF-3	01/10/14	Radiological	Radon-222	0.3	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167329	HF-4	01/10/14	Radiological	Radon-222	0.6	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167330	HF-5	01/10/14	Radiological	Radon-222	0.5	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167331	HF-6	01/10/14	Radiological	Radon-222	0.4	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167332	HF-7	01/10/14	Radiological	Radon-222	0.9	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167333	HF-8	01/10/14	Radiological	Radon-222	0.9	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167334	HF-9	01/10/14	Radiological	Radon-222	0.9	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring
HIS167335	HF-10	01/10/14	Radiological	Radon-222	0.9	0	0.2	pCi/L	J	Y01	HISS/Futura (Alpha Tracks)-Environmental Monitoring

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APPENDIX C

STORM-WATER, WASTE-WATER AND EXCAVATION-WATER DATA

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Table C-1. NPDES Analytical Data for 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ	Validation Reason Code
SVP130897	NPDES Outfall 002	04/18/13	ML-005	Th-228	0.275	0.32	0.514	pCi/L	UJ	T06
SVP130897	NPDES Outfall 002	04/18/13	ML-005	Th-230	0.551	0.375	0.166	pCi/L	J	F01, T04
SVP130897	NPDES Outfall 002	04/18/13	ML-005	Th-232	0.122	0.174	0.166	pCi/L	UJ	T06
SVP130897	NPDES Outfall 002	04/18/13	ML-006	Ra-226	0.139	0.621	1.67	pCi/L	UJ	T06
SVP130897	NPDES Outfall 002	04/18/13	ML-018	Gross Alpha	2.06	5.17	8.9	pCi/L	UJ	T06
SVP130897	NPDES Outfall 002	04/18/13	ML-018	Gross Beta	0.992	6.95	11.8	pCi/L	UJ	T06
SVP130897	NPDES Outfall 002	04/18/13	ML-003	Ac-227	-5.54	5.58	4.31	pCi/L	UJ	T04, T06
SVP130897	NPDES Outfall 002	04/18/13	ML-003	Pa-231	1.31	19.9	17.4	pCi/L	UJ	T04, T06
SVP130897	NPDES Outfall 002	04/18/13	ML-021	Total U	0.685	0.0625	2.5	pCi/L	U	T04, T05
SVP130897	NPDES Outfall 002	04/18/13	SW846 6020	Arsenic	2.1		1.2	ug/L	=	
SVP130897	NPDES Outfall 002	04/18/13	SW846 6020	Cadmium	0.12		0.1	ug/L	=	
SVP130897	NPDES Outfall 002	04/18/13	SW846 6020	Chromium	4.5		3.3	ug/L	=	
SVP130897	NPDES Outfall 002	04/18/13	EPA 160.5	SS	0.1		0.1	mL/L/hr	U	
SVP130897	NPDES Outfall 002	04/18/13	EPA 410.4	COD	24		6.5	mg/L	=	
SVP130897	NPDES Outfall 002	04/18/13	SW846 9040C	pH	7.06		0.1	No Units	=	
SVP130897	NPDES Outfall 002	04/18/13	EPA 1664	Oil and Grease	2.3		2.3	mg/L	U	
SVP130897	NPDES Outfall 002	04/18/13	EPA 1664	Total Recoverable Petroleum Hydrocarbons (TRPH)	2.4		2.4	mg/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1016	0.25		0.25	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1221	0.25		0.25	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1232	0.25		0.25	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1242	0.25		0.25	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1248	0.25		0.25	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1254	0.17		0.17	ug/L	U	
SVP130897	NPDES Outfall 002	04/18/13	SW846 8082	Aroclor-1260	0.17		0.17	ug/L	U	

Table C-2. North St. Louis County Sites Rainfall Data for CY 2013

First Quarter CY 2013 Data

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Jan	trace		
2-Jan			
3-Jan			
4-Jan			
5-Jan	trace		
6-Jan			
7-Jan			
8-Jan			
9-Jan	trace		
10-Jan	0.62		
11-Jan			
12-Jan	0.65		
13-Jan	trace		
14-Jan			
15-Jan			
16-Jan			
17-Jan			
18-Jan			
19-Jan			
20-Jan			
21-Jan	trace		
22-Jan	0.02		
23-Jan			
24-Jan			
25-Jan	trace		
26-Jan			
27-Jan	0.24		
28-Jan	trace		
29-Jan	1.44		
30-Jan	0.15		
31-Jan	trace		
Total (inches)	**3.12**		
Monthly Average			

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Feb			
2-Feb	0.12		
3-Feb	0.12		
4-Feb			
5-Feb			
6-Feb			
7-Feb	0.23		
8-Feb			
9-Feb	0.09		
10-Feb	0.46		
11-Feb			
12-Feb			
13-Feb			
14-Feb			
15-Feb			
16-Feb			
17-Feb			
18-Feb	0.16		
19-Feb			
20-Feb			
21-Feb	0.89		
22-Feb	0.01		
23-Feb			
24-Feb			
25-Feb	0.19		
26-Feb	0.84		
27-Feb	0.06		
28-Feb	0.03		
Total (inches)	**3.20**		
Monthly Average			

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Mar	0.08		
2-Mar	trace		
3-Mar	trace		
4-Mar	0.02		
5-Mar	0.25		
6-Mar	trace		
7-Mar			
8-Mar	trace		
9-Mar	0.44		
10-Mar	1.35		
11-Mar	0.01		
12-Mar	trace		
13-Mar	0.01		
14-Mar	trace		
15-Mar			
16-Mar	0.09		
17-Mar	1.19		
18-Mar	0.02		
19-Mar			
20-Mar	trace		
21-Mar			
22-Mar			
23-Mar	0.06		
24-Mar	1.25		
25-Mar	0.03		
26-Mar			
27-Mar	trace		
28-Mar	trace		
29-Mar			
30-Mar	0.15		
31-Mar			
Total (inches)	**4.95**		
Monthly Average			

[a] Outfall 002 is sampled annually per MDNR letter dated 02/19/02; as a result flow is not measured until a sample is collected.

[b] Un-named moving outfall is an outfall sampled during pumping activities or from a rain event producing a measurable flow off site.

Notes:

Flow measurements for the outfalls are reported in MGD and reported to three significant digits. All blank spaces represent zero flow.

Rainfall data is obtained from the National Weather Service Station at Lambert – St. Louis International Airport.

Table C-2. North St. Louis County Sites Rainfall Data for CY 2013

Second Quarter CY 2013 Data

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Apr	Trace		
2-Apr			
3-Apr			
4-Apr			
5-Apr			
6-Apr			
7-Apr	0.02		
8-Apr			
9-Apr			
10-Apr	1.02		
11-Apr	0.10		
12-Apr			
13-Apr			
14-Apr			
15-Apr	0.45		
16-Apr	0.45		
17-Apr	Trace		
18-Apr	2.48	0.401	
19-Apr	Trace		
20-Apr			
21-Apr			
22-Apr			
23-Apr	0.72		
24-Apr	0.01		
25-Apr			
26-Apr	Trace		
27-Apr	0.41		
28-Apr	0.01		
29-Apr			
30-Apr			
Total (inches)	**5.67**		
Monthly Average		**0.01**	

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-May			
2-May	0.37		
3-May	1.99		
4-May	Trace		
5-May	0.15		
6-May	Trace		
7-May			
8-May	Trace		
9-May	0.18		
10-May	Trace		
11-May			
12-May			
13-May			
14-May			
15-May			
16-May	Trace		
17-May	0.27		
18-May			
19-May			
20-May	1.22		
21-May	0.01		
22-May	Trace		
23-May	0.02		
24-May			
25-May	0.08		
26-May	0.02		
27-May	0.47		
28-May	0.05		
29-May			
30-May	0.56		
31-May	1.74		
Total (inches)	**7.13**		
Monthly Average			

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Jun	0.26		
2-Jun			
3-Jun			
4-Jun			
5-Jun	0.05		
6-Jun			
7-Jun			
8-Jun			
9-Jun	0.49		
10-Jun	0.06		
11-Jun			
12-Jun			
13-Jun	Trace		
14-Jun			
15-Jun	1.06		
16-Jun	0.24		
17-Jun	0.28		
18-Jun			
19-Jun			
20-Jun			
21-Jun			
22-Jun	0.02		
23-Jun	1.54		
24-Jun			
25-Jun			
26-Jun	1.44		
27-Jun			
28-Jun	0.01		
29-Jun	0.40		
30-Jun	0.01		
Total (inches)	**5.86**		
Monthly Average			

[a] Outfall 002 is sampled annually per MDNR letter dated 02/19/02; as a result flow is not measured until a sample is collected.

[b] Un-named moving outfall is an outfall sampled during pumping activities or from a rain event producing a measurable flow off site.

Notes:

Flow measurements for the outfalls are reported in MGD and reported to three significant digits. All blank spaces represent zero flow.

Rainfall data is obtained from the National Weather Service Station at Lambert – St. Louis International Airport.

Table C-2. North St. Louis County Sites Rainfall Data for CY 2013

Third Quarter CY 2013 Data

Date 2013	24-hour total (inches)	002[a] Outfall	Un-Named[b] Outfall Ballfields
1-Jul	Trace		
2-Jul	0.54		
3-Jul	Trace		
4-Jul			
5-Jul			
6-Jul	0.07		
7-Jul			
8-Jul			
9-Jul			
10-Jul	0.55		
11-Jul			
12-Jul			
13-Jul			
14-Jul	0.28		
15-Jul	Trace		
16-Jul			
17-Jul	0.05		
18-Jul	0.28		
19-Jul			
20-Jul			
21-Jul	Trace		
22-Jul	Trace		
23-Jul			
24-Jul			
25-Jul			
26-Jul	0.05		
27-Jul			
28-Jul			
29-Jul	Trace		
30-Jul	1.53		
31-Jul	Trace		
Total (inches)	**3.35**		
Monthly Average			

Date 2013	24-hour total (inches)	002[a] Outfall	Un-Named[b] Outfall Ballfields
1-Aug			
2-Aug	0.42		
3-Aug			
4-Aug			
5-Aug	Trace		
6-Aug	Trace		
7-Aug			
8-Aug	0.42		
9-Aug	Trace		
10-Aug			
11-Aug			
12-Aug	0.17		
13-Aug			
14-Aug			
15-Aug			
16-Aug			
17-Aug			
18-Aug			
19-Aug	Trace		
20-Aug			
21-Aug	Trace		
22-Aug			
23-Aug			
24-Aug			
25-Aug			
26-Aug			
27-Aug			
28-Aug			
29-Aug			
30-Aug			
31-Aug	0.18		
Total (inches)	**1.19**		
Monthly Average			

Date 2013	24-hour total (inches)	002[a] Outfall	Un-Named[b] Outfall Ballfields
1-Sep	1.81		
2-Sep			
3-Sep			
4-Sep			
5-Sep			
6-Sep			
7-Sep	Trace		
8-Sep	0.41		
9-Sep			
10-Sep			
11-Sep			
12-Sep	Trace		
13-Sep			
14-Sep			
15-Sep	0.01		
16-Sep	Trace		
17-Sep	0.03		
18-Sep	0.17		
19-Sep	Trace		
20-Sep	0.30		
21-Sep			
22-Sep			
23-Sep			
24-Sep			
25-Sep			
26-Sep			
27-Sep			
28-Sep	0.01		
29-Sep	Trace		
30-Sep			
Total (inches)	**2.74**		
Monthly Average			

[a] Outfall 002 is sampled annually per MDNR letter dated 02/19/02; as a result flow is not measured until a sample is collected.

[b] Un-named moving outfall is an outfall sampled during pumping activities or from a rain event producing a measurable flow off site.

Notes:

Flow measurements for the outfalls are reported in MGD and reported to three significant digits. All blank spaces represent zero flow.

Rainfall data is obtained from the National Weather Service Station at Lambert – St. Louis International Airport.

Table C-2. North St. Louis County Sites Rainfall Data for CY 2013

Fourth Quarter CY 2013 Data

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Oct			
2-Oct	0.18		
3-Oct	0.13		
4-Oct			
5-Oct	0.23		
6-Oct	0.01		
7-Oct			
8-Oct			
9-Oct			
10-Oct			
11-Oct			
12-Oct	0.02		
13-Oct			
14-Oct	trace		
15-Oct	0.48		
16-Oct	trace		
17-Oct	0.02		
18-Oct	0.10		
19-Oct	0.17		
20-Oct			
21-Oct			
22-Oct	0.10		
23-Oct	0.02		
24-Oct	trace		
25-Oct			
26-Oct			
27-Oct			
28-Oct			
29-Oct	0.13		
30-Oct	0.02		
31-Oct	0.74		
Total (inches)	**2.35**		
Monthly Average			

Date 2013	(inches) 24-hour total	Outfall 002[a]	Outfall Ballfields Un-Named[b]
1-Nov			
2-Nov			
3-Nov			
4-Nov			
5-Nov	0.21		
6-Nov	0.23		
7-Nov			
8-Nov			
9-Nov			
10-Nov			
11-Nov	0.06		
12-Nov	trace		
13-Nov			
14-Nov			
15-Nov	trace		
16-Nov	0.08		
17-Nov	trace		
18-Nov			
19-Nov			
20-Nov	0.07		
21-Nov	0.37		
22-Nov	trace		
23-Nov			
24-Nov			
25-Nov	trace		
26-Nov			
27-Nov			
28-Nov			
29-Nov			
30-Nov			
Total (inches)	**1.02**		
Monthly Average			

Date 2013	(inches) 24-hour total	Outfall 002[a,c]	Outfall Ballfields Un-Named[b]
1-Dec			
2-Dec			
3-Dec			
4-Dec	trace		
5-Dec	0.11		
6-Dec	trace		
7-Dec			
8-Dec	0.05		
9-Dec			
10-Dec			
11-Dec	0.03		
12-Dec			
13-Dec			
14-Dec	0.28		
15-Dec	0.08		
16-Dec	0.13		
17-Dec			
18-Dec			
19-Dec			
20-Dec	0.03		
21-Dec	0.90		
22-Dec	0.10		
23-Dec	trace		
24-Dec			
25-Dec			
26-Dec			
27-Dec			
28-Dec			
29-Dec			
30-Dec			
31-Dec			
Total (inches)	**1.71**		
Monthly Average			

[a] Outfall 002 is sampled annually per MDNR letter dated 02/19/02; as a result flow is not measured until a sample is collected.

[b] Un-named moving outfall is an outfall sampled during pumping activities or from a rain event producing a measurable flow off site.

[c] Outfall 002 returned to monthly sampling on 11/26/13.

Notes:

Flow measurements for the outfalls are reported in MGD and reported to three significant digits. All blank spaces represent zero flow.

Rainfall data is obtained from the National Weather Service Station at Lambert – St. Louis International Airport.

Table C-3. First Quarter Self-Monitoring Report for Excavation-Water Discharge at North St. Louis County Sites During CY 2013

Parameter	Batch Number	Date of Discharge	Batch Results[a]		Amount Discharged (Gallons)	Total Activity per Discharge[b] (Ci)	MSD Discharge Limit		SOR
Gross Alpha (raw water)	SLAPS-281	02/12/13 - 02/19/13 (Ballfields SLAPS VP)	12	pCi/L	175,486	8.0E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		4.0E-06	N/A		
Th-228			<0.6	pCi/L		2.1E-07	2,000	pCi/L	
Th-230			5	pCi/L		3.3E-06	1,000	pCi/L	
Uranium (KPA)			17	pCi/L		1.1E-05	3,000	pCi/L	
Ra-226[c]			<2	pCi/L		6.0E-07	10	pCi/L	
Ra-228[d,e]			<0.6	pCi/L		2.1E-07	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<10	pCi/L		-	-		
TSS			38	mg/L		-	-		
Gross Alpha (raw water)	SLAPS-282	03/13/13 - 03/28/13 (Ballfields SLAPS VP)	<9	pCi/L	327,933	5.8E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		7.7E-06	N/A		
Th-228			<0.8	pCi/L		5.2E-07	2,000	pCi/L	
Th-230			1	pCi/L		1.3E-06	1,000	pCi/L	
Uranium (KPA)			12	pCi/L		1.5E-05	3,000	pCi/L	
Ra-226[c]			<2	pCi/L		1.5E-06	10	pCi/L	
Ra-228[d,e]			<0.8	pCi/L		5.2E-07	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<9	pCi/L		-	-		
TSS			14	mg/L		-	-		

Total Activity Discharged in First Quarter of CY 2013 (Ci)

Th-228	7.3E-07
Th-230	4.6E-06
Uranium (KPA)	2.6E-05
Ra-226	2.1E-06
Ra-228[b]	7.3E-07

Total Activity Discharged through 03/31/13 (Ci)

Th-228	7.3E-07
Th-230	4.6E-06
Uranium (KPA)	2.6E-05
Ra-226	2.1E-06
Ra-228[b]	7.3E-07

Total Volume for First Quarter of CY 2013 (gallons)

Gallons 503,419

Total Volume Discharged through 03/31/13 (gallons)

Gallons 503,419

NOTES:

[a] Non-detect sample results are converted to half the detection limit for total activity.

[b] The weighted average was used to calculate the total activity.

[c] 10 *CFR* 20 limit is 600 pCi/L for Ra-226.

[d] Ra-228 assumed to be in equilibrium with Th-228.

[e] 10 *CFR* 20 limit is 600 pCi/L for Ra-228.

[f] The limit for selenium can be a daily total mass of 76 g, with a concentration not to exceed 0.90 mg/L.

[g] MSD surcharges apply for BOD concentration greater than 300 mg/L and COD concentration greater than 600 mg/L.

[h] Analysis for metals is not required per MSD Letter 05/24/12.

Ci - curie(s)

BOD – biological oxygen demand

COD - chemical oxygen demand

mg/L - milligram(s) per liter

N/A – Not applicable

pCi/L - picocurie(s) per liter

SOR - sum of ratios

TSS – total suspended solid(s)

- No data/No limit

Table C-3. Second Quarter Self-Monitoring Report for Excavation-Water Discharge at North St. Louis County Sites During CY 2013

Parameter	Batch Number	Date of Discharge	Batch Results[a]		Amount Discharged (Gallons)	Total Activity per Discharge[b] (Ci)	MSD Discharge Limit		SOR
Gross Alpha (raw water)	SLAPS-283	04/25/13 - 04/29/13 (Ballfields SLAPS VP)	<9	pCi/L	186,830	3.3E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		4.2E-06	N/A		
Th-228			<1	pCi/L		3.9E-07	2,000	pCi/L	
Th-230			2	pCi/L		1.7E-06	1,000	pCi/L	
Uranium (KPA)			5	pCi/L		3.6E-06	3,000	pCi/L	
Ra-226[c]			<1	pCi/L		4.5E-07	10	pCi/L	
Ra-228[d,e]			<1	pCi/L		3.9E-07	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<9	pCi/L		-	-		
TSS			25	mg/L		-	-		
Gross Alpha (raw water)	SLAPS-284	05/01/13 (Ballfields SLAPS VP)	<9	pCi/L	64,419	1.2E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		1.5E-06	N/A		
Th-228			<0.6	pCi/L		6.8E-08	2,000	pCi/L	
Th-230			2	pCi/L		3.9E-07	1,000	pCi/L	
Uranium (KPA)			6	pCi/L		1.5E-06	3,000	pCi/L	
Ra-226[c]			1.7	pCi/L		4.0E-07	10	pCi/L	
Ra-228[d,e]			<0.6	pCi/L		6.8E-08	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<9	pCi/L		-	-		
TSS			37	mg/L		-	-		
Gross Alpha (raw water)	SLAPS-285	06/04/13 - 06/06/13 (Ballfields SLAPS VP)	<12	pCi/L	227,140	5.3E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		5.3E-06	N/A		
Th-228			<0.5	pCi/L		2.1E-07	2,000	pCi/L	
Th-230			4	pCi/L		3.4E-06	1,000	pCi/L	
Uranium (KPA)			4	pCi/L		3.4E-06	3,000	pCi/L	
Ra-226[c]			<3	pCi/L		1.2E-06	10	pCi/L	
Ra-228[d,e]			<0.5	pCi/L		2.1E-07	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<12	pCi/L		-	-		
TSS			88	mg/L		-	-		

Total Activity Discharged in Second Quarter of CY 2013 (Ci)

Th-228	6.8E-07
Th-230	5.5E-06
Uranium (KPA)	8.5E-06
Ra-226	2.1E-06
Ra-228[b]	6.8E-07

Total Activity Discharged through 06/30/13 (Ci)

Th-228	1.4E-06
Th-230	1.0E-05
Uranium (KPA)	3.5E-05
Ra-226	4.2E-06
Ra-228[b]	1.4E-06

Total Volume for Second Quarter of CY 2013 (gallons)

Gallons 478,389

Total Volume Discharged through 06/30/13 (gallons)

Gallons 981,808

NOTES:

[a] Non-detect sample results are converted to half the detection limit for total activity.

[b] The weighted average was used to calculate the total activity.

[c] 10 *CFR* 20 limit is 600 pCi/L for Ra-226.

[d] Ra-228 assumed to be in equilibrium with Th-228.

[e] 10 *CFR* 20 limit is 600 pCi/L for Ra-228.

[f] The limit for selenium can be a daily total mass of 76 g, with a concentration not to exceed 0.90 mg/L.

[g] MSD surcharges apply for BOD concentration greater than 300 mg/L and COD concentration greater than 600 mg/L.

[h] Analysis for metals is not required per MSD Letter 05/24/12.

Ci - curie(s)

BOD – biological oxygen demand

COD - chemical oxygen demand

mg/L - milligram(s) per liter

N/A – Not applicable

pCi/L - picocurie(s) per liter

SOR - sum of ratios

TSS – total suspended solid(s)

\- No data/No limit

Table C-3. Third Quarter Self-Monitoring Report for Excavation-Water Discharge at North St. Louis County Sites During CY 2013

Parameter	Batch Number	Date of Discharge	Batch Results[a]		Amount Discharged (Gallons)	Total Activity per Discharge[b] (Ci)	MSD Discharge Limit		SOR
Gross Alpha (raw water)	SLAPS-286	07/16/13 - 07/31/13 (Ballfields SLAPS VP)	<21	pCi/L	149,630	5.8E-06	3,000	pCi/L	0.01
Gross Beta			<24	pCi/L		6.9E-06	N/A		
Th-228			<0.8	pCi/L		2.1E-07	2,000	pCi/L	
Th-230			3	pCi/L		1.6E-06	1,000	pCi/L	
Uranium (KPA)			4	pCi/L		2.3E-06	3,000	pCi/L	
Ra-226[c]			<3	pCi/L		7.1E-07	10	pCi/L	
Ra-228[d,e]			<0.8	pCi/L		2.1E-07	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<21	pCi/L		-	-		
TSS			42	mg/L		-	-		
Gross Alpha (raw water)	SLAPS-287	08/01/13 (Ballfields SLAPS VP)	<11	pCi/L	28,519	5.7E-07	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		6.5E-07	N/A		
Th-228			0.3	pCi/L		3.7E-08	2,000	pCi/L	
Th-230			2	pCi/L		2.5E-07	1,000	pCi/L	
Uranium (KPA)			2	pCi/L		2.2E-07	3,000	pCi/L	
Ra-226[c]			<2	pCi/L		1.0E-07	10	pCi/L	
Ra-228[d,e]			0.3	pCi/L		3.7E-08	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			<11	pCi/L		-	-		
TSS			18	mg/L		-	-		

Total Activity Discharged in Third Quarter of CY 2013 (Ci)

Th-228	2.5E-07
Th-230	1.9E-06
Uranium (KPA)	2.5E-06
Ra-226	8.1E-07
Ra-228[b]	2.5E-07

Total Activity Discharged through 09/30/13 (Ci)

Th-228	1.7E-06
Th-230	1.2E-05
Uranium (KPA)	3.7E-05
Ra-226	5.0E-06
Ra-228[b]	1.7E-06

Total Volume for Third Quarter of CY 2013 (gallons)

Gallons 178,149

Total Volume Discharged through 09/30/13 (gallons)

Gallons 1,159,957

NOTES:

[a] Non-detect sample results are converted to half the detection limit for total activity.
[b] The weighted average was used to calculate the total activity.
[c] 10 *CFR* 20 limit is 600 pCi/L for Ra-226.
[d] Ra-228 assumed to be in equilibrium with Th-228.
[e] 10 *CFR* 20 limit is 600 pCi/L for Ra-228.
[f] The limit for selenium can be a daily total mass of 76 g, with a concentration not to exceed 0.90 mg/L.
[g] MSD surcharges apply for BOD concentration greater than 300 mg/L and COD concentration greater than 600 mg/L.
[h] Analysis for metals is not required per MSD Letter 05/24/12.
Ci - curie(s)
BOD – biological oxygen demand
COD - chemical oxygen demand
mg/L - milligram(s) per liter
N/A – Not applicable
pCi/L - picocurie(s) per liter
SOR - sum of ratios
TSS – total suspended solid(s)
- No data/No limit

Table C-3. Fourth Quarter Self-Monitoring Report for Excavation-Water Discharge at North St. Louis County Sites During CY 2013

Parameter	Batch Number	Date of Discharge	Batch Results[a]		Amount Discharged (Gallons)	Total Activity per Discharge[b] (Ci)	MSD Discharge Limit		SOR
Gross Alpha (raw water)	SLAPS-288	12/03/13 (Ballfields SLAPS VP)	33	pCi/L	50,423	6.2E-06	3,000	pCi/L	0.01
Gross Beta			<12	pCi/L		1.1E-06	N/A		
Th-228			<0.4	pCi/L		4.2E-08	2,000	pCi/L	
Th-230			1	pCi/L		2.0E-07	1,000	pCi/L	
Uranium (KPA)			32	pCi/L		6.0E-06	3,000	pCi/L	
Ra-226[c]			<2	pCi/L		2.4E-07	10	pCi/L	
Ra-228[d,e]			<0.4	pCi/L		4.2E-08	30	pCi/L	
Barium			[h]	mg/L		-	10	mg/L	
Lead			[h]	mg/L		-	0.4	mg/L	
Selenium[f]			[h]	mg/L		-	0.2	mg/L[f]	
BOD[g]				mg/L		-	-		
COD[g]				mg/L		-	-		
Gross Alpha (TSS filtrate)			36	pCi/L		-	-		
TSS			13	mg/L		-	-		

During the fourth quarter, no waste water was discharged to the MSD from the SLAPS, SLAPS VPs, or Latty Avenue Properties.

Total Activity Discharged in Fourth Quarter of CY 2013 (Ci)		**Total Activity Discharged through 12/31/13 (Ci)**	
Th-228	4.2E-08	**Th-228**	1.7E-06
Th-230	2.0E-07	**Th-230**	1.2E-05
Uranium (KPA)	6.0E-06	**Uranium (KPA)**	4.3E-05
Ra-226	2.4E-07	**Ra-226**	5.2E-06
Ra-228[b]	4.2E-08	**Ra-228[b]**	1.7E-06

Total Volume for Fourth Quarter of CY 2013 (gallons)		**Total Volume Discharged through 12/31/13 (gallons)**	
Gallons	50,423	**Gallons**	1,210,380

NOTES:

[a] Non-detect sample results are converted to half the detection limit for total activity.
[b] The weighted average was used to calculate the total activity.
[c] 10 *CFR* 20 limit is 600 pCi/L for Ra-226.
[d] Ra-228 assumed to be in equilibrium with Th-228.
[e] 10 *CFR* 20 limit is 600 pCi/L for Ra-228.
[f] The limit for selenium can be a daily total mass of 76 g, with a concentration not to exceed 0.90 mg/L.
[g] MSD surcharges apply for BOD concentration greater than 300 mg/L and COD concentration greater than 600 mg/L.
[h] Analysis for metals is not required per MSD Letter 05/24/12.

Ci - curie(s)
BOD – biological oxygen demand
COD - chemical oxygen demand
mg/L - milligram(s) per liter
N/A – Not applicable
pCi/L - picocurie(s) per liter
SOR - sum of ratios
TSS – total suspended solid(s)
- No data/No limit

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APPENDIX D

COLDWATER CREEK SURFACE-WATER AND SEDIMENT DATA

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Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Thorium-228	0.237	0.446	0.873	pCi/L	UJ
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Thorium-230	1.19	0.779	0.322	pCi/L	J
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Thorium-232	0	0	0.321	pCi/L	U
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Radium-226	2.15	1.45	1.36	pCi/L	J
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Uranium-234	1.15	0.663	0.223	pCi/L	J
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Uranium-235	-0.0508	0.102	0.61	pCi/L	UJ
CWC152876	CWC002	04/03/13	Alpha Spectroscopy	Uranium-238	0.492	0.415	0.222	pCi/L	J
CWC152876	CWC002	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC152876	CWC002	04/03/13	Metals	Arsenic	3.6		1.2	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Barium	160		0.22	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152876	CWC002	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152876	CWC002	04/03/13	Metals	Molybdenum	10		1	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Nickel	2.3		0.4	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Selenium	3.8		1.6	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Thallium	0.69		0.55	µg/L	=
CWC152876	CWC002	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Thorium-228	0.424	0.496	0.383	pCi/L	UJ
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Thorium-230	0.566	0.575	0.383	pCi/L	UJ
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Thorium-232	0.141	0.284	0.383	pCi/L	UJ
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Radium-226	1.62	1.23	0.627	pCi/L	J
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Uranium-234	1.53	0.771	0.218	pCi/L	J
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Uranium-235	0.199	0.284	0.269	pCi/L	UJ
CWC152878	CWC003	04/03/13	Alpha Spectroscopy	Uranium-238	1.04	0.617	0.217	pCi/L	J
CWC152878	CWC003	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC152878	CWC003	04/03/13	Metals	Arsenic	3.6		1.2	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Barium	160		0.22	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152878	CWC003	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152878	CWC003	04/03/13	Metals	Molybdenum	11		1	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Nickel	2.2		0.4	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Selenium	2.7		1.6	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Thallium	0.88		0.55	µg/L	=
CWC152878	CWC003	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Thorium-228	0.594	0.549	0.648	pCi/L	U
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Thorium-230	0.378	0.45	0.648	pCi/L	UJ
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Thorium-232	0.216	0.307	0.292	pCi/L	UJ
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Radium-226	1.05	1.23	1.93	pCi/L	UJ

Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Uranium-234	0.615	0.483	0.238	pCi/L	J
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Uranium-235	0	0	0.294	pCi/L	U
CWC152880	CWC004	04/03/13	Alpha Spectroscopy	Uranium-238	0.175	0.25	0.237	pCi/L	UJ
CWC152880	CWC004	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC152880	CWC004	04/03/13	Metals	Arsenic	3.1		1.2	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Barium	150		0.22	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152880	CWC004	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152880	CWC004	04/03/13	Metals	Molybdenum	10		1	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Nickel	2.5		0.4	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Selenium	3.7		1.6	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Thallium	0.85		0.55	µg/L	=
CWC152880	CWC004	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Thorium-228	0.173	0.348	0.693	pCi/L	UJ
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Thorium-230	0.694	0.579	0.314	pCi/L	J
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Thorium-232	0.116	0.232	0.313	pCi/L	UJ
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Radium-226	0.217	0.688	1.6	pCi/L	UJ
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Uranium-234	0.766	0.51	0.208	pCi/L	J
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Uranium-235	-0.0473	0.095	0.567	pCi/L	UJ
CWC152882	CWC005	04/03/13	Alpha Spectroscopy	Uranium-238	0.801	0.538	0.458	pCi/L	J
CWC152882	CWC005	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC152882	CWC005	04/03/13	Metals	Arsenic	2.9		1.2	µg/L	=
CWC152882	CWC005	04/03/13	Metals	Barium	170		0.22	µg/L	=
CWC152882	CWC005	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152882	CWC005	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152882	CWC005	04/03/13	Metals	Molybdenum	10		1	µg/L	=
CWC152882	CWC005	04/03/13	Metals	Nickel	3.2		0.4	µg/L	=
CWC152882	CWC005	04/03/13	Metals	Selenium	2		1.6	µg/L	=
CWC152882	CWC005	04/03/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC152882	CWC005	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Thorium-228	0.371	0.376	0.252	pCi/L	UJ
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Thorium-230	0.744	0.539	0.252	pCi/L	J
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Thorium-232	0	0	0.251	pCi/L	U
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Radium-226	0.3	0.6	1.2	pCi/L	UJ
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Uranium-234	0.396	0.364	0.215	pCi/L	J
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Uranium-235	-1.58E-05	0.24	0.72	pCi/L	UJ
CWC152884	CWC006	04/03/13	Alpha Spectroscopy	Uranium-238	0.474	0.399	0.214	pCi/L	J
CWC152884	CWC006	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U

Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC152884	CWC006	04/03/13	Metals	Arsenic	2.3		1.2	µg/L	=
CWC152884	CWC006	04/03/13	Metals	Barium	150		0.22	µg/L	=
CWC152884	CWC006	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152884	CWC006	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152884	CWC006	04/03/13	Metals	Molybdenum	8.7		1	µg/L	=
CWC152884	CWC006	04/03/13	Metals	Nickel	2.7		0.4	µg/L	=
CWC152884	CWC006	04/03/13	Metals	Selenium	5		1.6	µg/L	=
CWC152884	CWC006	04/03/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC152884	CWC006	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Thorium-228	0.54	0.559	0.795	pCi/L	UJ
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Thorium-230	0.108	0.217	0.293	pCi/L	UJ
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Thorium-232	0	0	0.293	pCi/L	U
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Radium-226	1.42	1.08	0.549	pCi/L	J
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Uranium-234	0.93	0.595	0.229	pCi/L	J
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Uranium-235	0.104	0.21	0.283	pCi/L	UJ
CWC152886	CWC007	04/03/13	Alpha Spectroscopy	Uranium-238	0.421	0.387	0.228	pCi/L	J
CWC152886	CWC007	04/03/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC152886	CWC007	04/03/13	Metals	Arsenic	2.2		1.2	µg/L	=
CWC152886	CWC007	04/03/13	Metals	Barium	150		0.22	µg/L	=
CWC152886	CWC007	04/03/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC152886	CWC007	04/03/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC152886	CWC007	04/03/13	Metals	Molybdenum	8.9		1	µg/L	=
CWC152886	CWC007	04/03/13	Metals	Nickel	2.5		0.4	µg/L	=
CWC152886	CWC007	04/03/13	Metals	Selenium	2.4		1.6	µg/L	=
CWC152886	CWC007	04/03/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC152886	CWC007	04/03/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Thorium-228	0.395	0.407	0.527	pCi/L	UJ
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Thorium-230	0.616	0.522	0.648	pCi/L	U
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Thorium-232	0	0	0.238	pCi/L	U
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Radium-226	1.86	1.63	2.5	pCi/L	U
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Uranium-234	1.05	0.619	0.515	pCi/L	J
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Uranium-235	-0.0381	0.0766	0.522	pCi/L	UJ
CWC165454	CWC002	10/17/13	Alpha Spectroscopy	Uranium-238	0.737	0.491	0.2	pCi/L	J
CWC165454	CWC002	10/17/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC165454	CWC002	10/17/13	Metals	Arsenic	3.8		1.2	µg/L	=
CWC165454	CWC002	10/17/13	Metals	Barium	110		0.22	µg/L	=
CWC165454	CWC002	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165454	CWC002	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U

Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC165454	CWC002	10/17/13	Metals	Molybdenum	16		1	µg/L	=
CWC165454	CWC002	10/17/13	Metals	Nickel	2.3		0.4	µg/L	=
CWC165454	CWC002	10/17/13	Metals	Selenium	2.5		1.6	µg/L	=
CWC165454	CWC002	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC165454	CWC002	10/17/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Thorium-228	0.184	0.267	0.442	pCi/L	UJ
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Thorium-230	0.702	0.484	0.443	pCi/L	J
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Thorium-232	-0.0737	0.105	0.543	pCi/L	UJ
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Radium-226	1.06	1.08	1.41	pCi/L	UJ
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Uranium-234	0.946	0.707	0.32	pCi/L	J
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Uranium-235	0.0851	0.317	0.833	pCi/L	UJ
CWC165456	CWC003	10/17/13	Alpha Spectroscopy	Uranium-238	0.304	0.426	0.673	pCi/L	UJ
CWC165456	CWC003	10/17/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC165456	CWC003	10/17/13	Metals	Arsenic	2.9		1.2	µg/L	=
CWC165456	CWC003	10/17/13	Metals	Barium	110		0.22	µg/L	=
CWC165456	CWC003	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165456	CWC003	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC165456	CWC003	10/17/13	Metals	Molybdenum	15		1	µg/L	=
CWC165456	CWC003	10/17/13	Metals	Nickel	2.3		0.4	µg/L	=
CWC165456	CWC003	10/17/13	Metals	Selenium	2.5		1.6	µg/L	=
CWC165456	CWC003	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC165456	CWC003	10/17/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Thorium-228	0.261	0.264	0.177	pCi/L	UJ
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Thorium-230	0.327	0.296	0.177	pCi/L	J
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Thorium-232	-0.0326	0.0654	0.391	pCi/L	UJ
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Radium-226	1.24	1.25	1.93	pCi/L	UJ
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Uranium-234	0.737	0.582	0.285	pCi/L	J
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Uranium-235	0	0	0.352	pCi/L	U
CWC165458	CWC004	10/17/13	Alpha Spectroscopy	Uranium-238	0.943	0.666	0.284	pCi/L	J
CWC165458	CWC004	10/17/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC165458	CWC004	10/17/13	Metals	Arsenic	3		1.2	µg/L	=
CWC165458	CWC004	10/17/13	Metals	Barium	110		0.22	µg/L	=
CWC165458	CWC004	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165458	CWC004	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC165458	CWC004	10/17/13	Metals	Molybdenum	15		1	µg/L	=
CWC165458	CWC004	10/17/13	Metals	Nickel	2.3		0.4	µg/L	=
CWC165458	CWC004	10/17/13	Metals	Selenium	2.8		1.6	µg/L	=
CWC165458	CWC004	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U

Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC165458	CWC004	10/17/13	Metals	Vanadium	2.4		2.4	µg/L	U
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Thorium-228	0.105	0.21	0.419	pCi/L	UJ
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Thorium-230	0.629	0.429	0.189	pCi/L	J
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Thorium-232	-0.0349	0.0699	0.418	pCi/L	UJ
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Radium-226	0.718	1.02	1.76	pCi/L	UJ
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Uranium-234	0.393	0.403	0.266	pCi/L	UJ
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Uranium-235	0.121	0.244	0.329	pCi/L	UJ
CWC165460	CWC005	10/17/13	Alpha Spectroscopy	Uranium-238	0.449	0.457	0.559	pCi/L	UJ
CWC165460	CWC005	10/17/13	Metals	Antimony	1.7		1.7	µg/L	U
CWC165460	CWC005	10/17/13	Metals	Arsenic	2.5		1.2	µg/L	=
CWC165460	CWC005	10/17/13	Metals	Barium	98		0.22	µg/L	=
CWC165460	CWC005	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165460	CWC005	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC165460	CWC005	10/17/13	Metals	Molybdenum	11		1	µg/L	=
CWC165460	CWC005	10/17/13	Metals	Nickel	2.4		0.4	µg/L	=
CWC165460	CWC005	10/17/13	Metals	Selenium	1.8		1.6	µg/L	=
CWC165460	CWC005	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC165460	CWC005	10/17/13	Metals	Vanadium	3.1		2.4	µg/L	=
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Thorium-228	0.191	0.222	0.173	pCi/L	UJ
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Thorium-230	0.255	0.258	0.173	pCi/L	UJ
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Thorium-232	0.127	0.181	0.173	pCi/L	UJ
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Radium-226	0.36	0.72	1.44	pCi/L	UJ
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Uranium-234	1.15	0.714	0.26	pCi/L	J
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Uranium-235	0.188	0.352	0.677	pCi/L	UJ
CWC165462	CWC006	10/17/13	Alpha Spectroscopy	Uranium-238	0.765	0.568	0.259	pCi/L	J
CWC165462	CWC006	10/17/13	Metals	Antimony	2.4		1.7	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Arsenic	2.1		1.2	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Barium	84		0.22	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165462	CWC006	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC165462	CWC006	10/17/13	Metals	Molybdenum	8.9		1	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Nickel	2.2		0.4	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Selenium	2.6		1.6	µg/L	=
CWC165462	CWC006	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC165462	CWC006	10/17/13	Metals	Vanadium	2.9		2.4	µg/L	=
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Thorium-228	0.138	0.196	0.187	pCi/L	UJ
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Thorium-230	0.899	0.515	0.188	pCi/L	J
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Thorium-232	-6.40E-06	0.169	0.508	pCi/L	UJ

Table D-1. Coldwater Creek Surface Water Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Error	DL	Units	VQ
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Radium-226	-9.99E-06	0.748	2.01	pCi/L	UJ
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Uranium-234	1.61	0.86	0.524	pCi/L	J
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Uranium-235	0.113	0.228	0.307	pCi/L	UJ
CWC165483	CWC007	10/17/13	Alpha Spectroscopy	Uranium-238	2.1	0.992	0.248	pCi/L	J
CWC165483	CWC007	10/17/13	Metals	Antimony	2.3		1.7	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Arsenic	2.4		1.2	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Barium	81		0.22	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Cadmium	0.1		0.1	µg/L	U
CWC165483	CWC007	10/17/13	Metals	Chromium	3.3		3.3	µg/L	U
CWC165483	CWC007	10/17/13	Metals	Molybdenum	10		1	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Nickel	2.5		0.4	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Selenium	2.3		1.6	µg/L	=
CWC165483	CWC007	10/17/13	Metals	Thallium	0.55		0.55	µg/L	U
CWC165483	CWC007	10/17/13	Metals	Vanadium	3.4		2.4	µg/L	=

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC152877	CWC002	04/03/13	Alpha Spectroscopy	Thorium-228	0.30	0.26	pCi/g	J	F01, T04
CWC152877	CWC002	04/03/13	Alpha Spectroscopy	Thorium-230	1.06	0.31	pCi/g	J	F01
CWC152877	CWC002	04/03/13	Alpha Spectroscopy	Thorium-232	0.36	0.14	pCi/g	J	F01, T04
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Actinium-227	-0.0458	0.181	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Americium-241	0.0101	0.0386	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Cesium-137	-0.0114	0.0176	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Potassium-40	8.57	0.179	pCi/g	=	
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Protactinium-231	-0.249	0.55	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Radium-226	0.91	0.0453	pCi/g	=	
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Radium-228	0.30	0.0765	pCi/g	J	F01
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Thorium-228	0.30	0.0765	pCi/g	J	F01
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Thorium-230	0.521	3.63	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Thorium-232	0.303	0.0765	pCi/g	J	F01
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Uranium-235	-0.07	0.23	pCi/g	UJ	T04, T06
CWC152877	CWC002	04/03/13	Gamma Spectroscopy	Uranium-238	0.74	0.376	pCi/g	J	T04
CWC152877	CWC002	04/03/13	Metals	Antimony	1.5	1.5	mg/kg	U	
CWC152877	CWC002	04/03/13	Metals	Arsenic	1.7	0.72	mg/kg	=	
CWC152877	CWC002	04/03/13	Metals	Barium	21	0.57	mg/kg	J	H01, H04
CWC152877	CWC002	04/03/13	Metals	Cadmium	0.41	0.23	mg/kg	=	
CWC152877	CWC002	04/03/13	Metals	Chromium	4	0.7	mg/kg	=	
CWC152877	CWC002	04/03/13	Metals	Molybdenum	2.3	2.3	mg/kg	U	
CWC152877	CWC002	04/03/13	Metals	Nickel	3	0.51	mg/kg	=	
CWC152877	CWC002	04/03/13	Metals	Selenium	2.1	0.66	mg/kg	=	
CWC152877	CWC002	04/03/13	Metals	Thallium	3.4	3.4	mg/kg	U	
CWC152877	CWC002	04/03/13	Metals	Vanadium	5.3	2.9	mg/kg	=	
CWC152879	CWC003	04/03/13	Alpha Spectroscopy	Thorium-228	1.01	0.27	pCi/g	J	F01
CWC152879	CWC003	04/03/13	Alpha Spectroscopy	Thorium-230	3.92	0.122	pCi/g	=	
CWC152879	CWC003	04/03/13	Alpha Spectroscopy	Thorium-232	0.99	0.12	pCi/g	J	F01
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Actinium-227	0.126	0.32	pCi/g	UJ	T04, T06
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Americium-241	0.00262	0.0614	pCi/g	UJ	T04, T06
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Cesium-137	0.101	0.0302	pCi/g	=	
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Potassium-40	15.5	0.287	pCi/g	=	
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Protactinium-231	0.121	0.82	pCi/g	UJ	T04, T06
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Radium-226	1.41	0.0777	pCi/g	=	

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Radium-228	0.91	0.111	pCi/g	=	
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Thorium-228	0.91	0.111	pCi/g	=	
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Thorium-230	-1.36	6.04	pCi/g	UJ	T04, T06
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Thorium-232	0.912	0.111	pCi/g	=	
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Uranium-235	-0.10	0.37	pCi/g	UJ	T04, T06
CWC152879	CWC003	04/03/13	Gamma Spectroscopy	Uranium-238	0.90	0.589	pCi/g	J	T04
CWC152879	CWC003	04/03/13	Metals	Antimony	2.1	2.1	mg/kg	U	
CWC152879	CWC003	04/03/13	Metals	Arsenic	8.7	1	mg/kg	=	
CWC152879	CWC003	04/03/13	Metals	Barium	150	0.8	mg/kg	J	H01, H04
CWC152879	CWC003	04/03/13	Metals	Cadmium	0.32	0.32	mg/kg	=	
CWC152879	CWC003	04/03/13	Metals	Chromium	13	0.98	mg/kg	=	
CWC152879	CWC003	04/03/13	Metals	Molybdenum	3.2	3.2	mg/kg	U	
CWC152879	CWC003	04/03/13	Metals	Nickel	21	0.72	mg/kg	=	
CWC152879	CWC003	04/03/13	Metals	Selenium	1.7	0.93	mg/kg	=	
CWC152879	CWC003	04/03/13	Metals	Thallium	4.8	4.8	mg/kg	U	
CWC152879	CWC003	04/03/13	Metals	Vanadium	25	4	mg/kg	=	
CWC152881	CWC004	04/03/13	Alpha Spectroscopy	Thorium-228	0.74	0.134	pCi/g	J	F01, T04
CWC152881	CWC004	04/03/13	Alpha Spectroscopy	Thorium-230	2.37	0.134	pCi/g	J	F01
CWC152881	CWC004	04/03/13	Alpha Spectroscopy	Thorium-232	0.84	0.13	pCi/g	J	F01, T04
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Actinium-227	0.0314	0.24	pCi/g	UJ	T04, T06
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Americium-241	0.0214	0.0522	pCi/g	UJ	T04, T06
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Cesium-137	0.0151	0.028	pCi/g	UJ	T04, T06
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Potassium-40	13	0.202	pCi/g	=	
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Protactinium-231	0.292	0.66	pCi/g	UJ	T04, T06
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Radium-226	1.16	0.0615	pCi/g	=	
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Radium-228	0.72	0.0871	pCi/g	=	
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Thorium-228	0.72	0.0871	pCi/g	=	
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Thorium-230	4.61	5.03	pCi/g	UJ	T04, T05
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Thorium-232	0.718	0.0871	pCi/g	=	
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Uranium-235	0.05	0.30	pCi/g	UJ	T04, T06
CWC152881	CWC004	04/03/13	Gamma Spectroscopy	Uranium-238	0.96	0.493	pCi/g	J	T04
CWC152881	CWC004	04/03/13	Metals	Antimony	1.9	1.9	mg/kg	U	
CWC152881	CWC004	04/03/13	Metals	Arsenic	7.9	0.96	mg/kg	=	
CWC152881	CWC004	04/03/13	Metals	Barium	230	0.75	mg/kg	J	H01, H04

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC152881	CWC004	04/03/13	Metals	Cadmium	0.9	0.3	mg/kg	=	
CWC152881	CWC004	04/03/13	Metals	Chromium	24	0.93	mg/kg	=	
CWC152881	CWC004	04/03/13	Metals	Molybdenum	3	3	mg/kg	U	
CWC152881	CWC004	04/03/13	Metals	Nickel	20	0.68	mg/kg	=	
CWC152881	CWC004	04/03/13	Metals	Selenium	0.87	0.87	mg/kg	U	
CWC152881	CWC004	04/03/13	Metals	Thallium	4.6	4.6	mg/kg	U	
CWC152881	CWC004	04/03/13	Metals	Vanadium	25	3.8	mg/kg	=	
CWC152883	CWC005	04/03/13	Alpha Spectroscopy	Thorium-228	0.64	0.273	pCi/g	J	F01, T04
CWC152883	CWC005	04/03/13	Alpha Spectroscopy	Thorium-230	4.65	0.273	pCi/g	=	
CWC152883	CWC005	04/03/13	Alpha Spectroscopy	Thorium-232	1.08	0.15	pCi/g	J	F01
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Actinium-227	0.0208	0.33	pCi/g	UJ	T04, T06
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Americium-241	0.0217	0.0682	pCi/g	UJ	T04, T06
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Cesium-137	0.0551	0.038	pCi/g	J	T04
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Potassium-40	12.5	0.367	pCi/g	=	
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Protactinium-231	-0.359	0.92	pCi/g	UJ	T04, T06
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Radium-226	1.28	0.0843	pCi/g	=	
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Radium-228	0.87	0.12	pCi/g	=	
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Thorium-228	0.87	0.12	pCi/g	=	
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Thorium-230	7.65	6.29	pCi/g	J	T04
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Thorium-232	0.867	0.12	pCi/g	=	
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Uranium-235	0.07	0.39	pCi/g	UJ	T04, T06
CWC152883	CWC005	04/03/13	Gamma Spectroscopy	Uranium-238	0.90	0.61	pCi/g	J	T04
CWC152883	CWC005	04/03/13	Metals	Antimony	2.3	2.3	mg/kg	U	
CWC152883	CWC005	04/03/13	Metals	Arsenic	6.7	1.1	mg/kg	=	
CWC152883	CWC005	04/03/13	Metals	Barium	160	0.88	mg/kg	J	H01, H04
CWC152883	CWC005	04/03/13	Metals	Cadmium	0.98	0.35	mg/kg	=	
CWC152883	CWC005	04/03/13	Metals	Chromium	23	1.1	mg/kg	=	
CWC152883	CWC005	04/03/13	Metals	Molybdenum	3.5	3.5	mg/kg	U	
CWC152883	CWC005	04/03/13	Metals	Nickel	19	0.79	mg/kg	=	
CWC152883	CWC005	04/03/13	Metals	Selenium	1	1	mg/kg	U	
CWC152883	CWC005	04/03/13	Metals	Thallium	5.3	5.3	mg/kg	U	
CWC152883	CWC005	04/03/13	Metals	Vanadium	18	4.4	mg/kg	=	
CWC152885	CWC006	04/03/13	Alpha Spectroscopy	Thorium-228	0.97	0.206	pCi/g	J	F01
CWC152885	CWC006	04/03/13	Alpha Spectroscopy	Thorium-230	2.18	0.111	pCi/g	J	F01

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC152885	CWC006	04/03/13	Alpha Spectroscopy	Thorium-232	1.31	0.11	pCi/g	J	F01
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Actinium-227	-0.0172	0.29	pCi/g	UJ	T04, T06
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Americium-241	0.00817	0.0594	pCi/g	UJ	T04, T06
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Cesium-137	0.022	0.033	pCi/g	UJ	T04, T05
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Potassium-40	15.3	0.282	pCi/g	=	
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Protactinium-231	0.426	0.80	pCi/g	UJ	T04, T06
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Radium-226	1.13	0.0711	pCi/g	=	
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Radium-228	0.99	0.0985	pCi/g	=	
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Thorium-228	0.99	0.0985	pCi/g	=	
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Thorium-230	2.04	5.88	pCi/g	UJ	T04, T06
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Thorium-232	0.985	0.0985	pCi/g	=	
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Uranium-235	0.07	0.35	pCi/g	UJ	T04, T06
CWC152885	CWC006	04/03/13	Gamma Spectroscopy	Uranium-238	0.73	0.576	pCi/g	J	T04
CWC152885	CWC006	04/03/13	Metals	Antimony	1.8	1.8	mg/kg	U	
CWC152885	CWC006	04/03/13	Metals	Arsenic	3.9	0.91	mg/kg	=	
CWC152885	CWC006	04/03/13	Metals	Barium	83	0.71	mg/kg	J	H01, H04
CWC152885	CWC006	04/03/13	Metals	Cadmium	0.29	0.29	mg/kg	U	
CWC152885	CWC006	04/03/13	Metals	Chromium	14	0.88	mg/kg	=	
CWC152885	CWC006	04/03/13	Metals	Molybdenum	2.9	2.9	mg/kg	U	
CWC152885	CWC006	04/03/13	Metals	Nickel	13	0.64	mg/kg	=	
CWC152885	CWC006	04/03/13	Metals	Selenium	0.83	0.83	mg/kg	U	
CWC152885	CWC006	04/03/13	Metals	Thallium	4.3	4.3	mg/kg	U	
CWC152885	CWC006	04/03/13	Metals	Vanadium	17	3.6	mg/kg	=	
CWC152887	CWC007	04/03/13	Alpha Spectroscopy	Thorium-228	0.86	0.209	pCi/g	J	F01
CWC152887	CWC007	04/03/13	Alpha Spectroscopy	Thorium-230	3.25	0.113	pCi/g	=	
CWC152887	CWC007	04/03/13	Alpha Spectroscopy	Thorium-232	0.62	0.11	pCi/g	J	F01, T04
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Actinium-227	0.112	0.32	pCi/g	UJ	T04, T06
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Americium-241	0.0115	0.0665	pCi/g	UJ	T04, T06
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Cesium-137	0.0327	0.0416	pCi/g	UJ	T04, T05
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Potassium-40	14	0.309	pCi/g	=	
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Protactinium-231	-0.0942	0.85	pCi/g	UJ	T04, T06
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Radium-226	1.32	0.0832	pCi/g	=	
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Radium-228	0.85	0.12	pCi/g	=	
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Thorium-228	0.85	0.12	pCi/g	=	

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Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Thorium-230	7.01	6.68	pCi/g	UJ	T04
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Thorium-232	0.847	0.12	pCi/g	=	
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Uranium-235	0.03	0.38	pCi/g	UJ	T04, T06
CWC152887	CWC007	04/03/13	Gamma Spectroscopy	Uranium-238	1.05	0.666	pCi/g	J	T04
CWC152887	CWC007	04/03/13	Metals	Antimony	2	2	mg/kg	U	
CWC152887	CWC007	04/03/13	Metals	Arsenic	7.5	0.99	mg/kg	=	
CWC152887	CWC007	04/03/13	Metals	Barium	150	0.78	mg/kg	J	H01, H04
CWC152887	CWC007	04/03/13	Metals	Cadmium	0.75	0.31	mg/kg	=	
CWC152887	CWC007	04/03/13	Metals	Chromium	23	0.96	mg/kg	=	
CWC152887	CWC007	04/03/13	Metals	Molybdenum	3.1	3.1	mg/kg	U	
CWC152887	CWC007	04/03/13	Metals	Nickel	17	0.7	mg/kg	=	
CWC152887	CWC007	04/03/13	Metals	Selenium	0.9	0.9	mg/kg	U	
CWC152887	CWC007	04/03/13	Metals	Thallium	4.7	4.7	mg/kg	U	
CWC152887	CWC007	04/03/13	Metals	Vanadium	20	3.9	mg/kg	=	
CWC165455	CWC002	10/17/13	Alpha Spectroscopy	Thorium-228	0.24	0.162	pCi/g	UJ	T02
CWC165455	CWC002	10/17/13	Alpha Spectroscopy	Thorium-230	1.20	0.557	pCi/g	J	F01, T04
CWC165455	CWC002	10/17/13	Alpha Spectroscopy	Thorium-232	0.30	0.44	pCi/g	UJ	T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Actinium-227	-0.00912	0.121	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Americium-241	0.00745	0.0272	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Cesium-137	0.00502	0.0106	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Potassium-40	6.73	0.0638	pCi/g	=	
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Protactinium-231	0.0336	0.33	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Radium-226	1.01	0.0301	pCi/g	=	
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Radium-228	0.28	0.0352	pCi/g	=	
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Thorium-228	0.28	0.0352	pCi/g	=	
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Thorium-230	0.149	2.61	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Thorium-232	0.28	0.0352	pCi/g	=	
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Uranium-235	0.00	0.17	pCi/g	UJ	T04, T06
CWC165455	CWC002	10/17/13	Gamma Spectroscopy	Uranium-238	0.51	0.261	pCi/g	=	
CWC165455	CWC002	10/17/13	Metals	Antimony	0.88	0.88	mg/kg	U	
CWC165455	CWC002	10/17/13	Metals	Arsenic	13	1.4	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Barium	2,800	0.5	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Cadmium	1.1	0.085	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Chromium	170	2.4	mg/kg	J	H03

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC165455	CWC002	10/17/13	Metals	Molybdenum	6.9	0.66	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Nickel	16	0.57	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Selenium	1.4	0.84	mg/kg	=	
CWC165455	CWC002	10/17/13	Metals	Thallium	0.81	0.81	mg/kg	U	
CWC165455	CWC002	10/17/13	Metals	Vanadium	25	3.9	mg/kg	=	
CWC165457	CWC003	10/17/13	Alpha Spectroscopy	Thorium-228	0.94	0.345	pCi/g	J	T04
CWC165457	CWC003	10/17/13	Alpha Spectroscopy	Thorium-230	1.90	0.346	pCi/g	J	F01
CWC165457	CWC003	10/17/13	Alpha Spectroscopy	Thorium-232	0.26	0.35	pCi/g	UJ	T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Actinium-227	-0.00246	0.13	pCi/g	UJ	T04, T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Americium-241	0.0267	0.0298	pCi/g	UJ	T04, T05
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Cesium-137	0.00491	0.0123	pCi/g	UJ	T04, T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Potassium-40	8.47	0.0755	pCi/g	=	
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Protactinium-231	0.0915	0.34	pCi/g	UJ	T04, T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Radium-226	1.03	0.0303	pCi/g	=	
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Radium-228	0.36	0.038	pCi/g	=	
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Thorium-228	0.36	0.038	pCi/g	=	
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Thorium-230	0.656	2.78	pCi/g	UJ	T04, T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Thorium-232	0.361	0.038	pCi/g	=	
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Uranium-235	0.01	0.18	pCi/g	UJ	T04, T06
CWC165457	CWC003	10/17/13	Gamma Spectroscopy	Uranium-238	0.50	0.282	pCi/g	J	T04
CWC165457	CWC003	10/17/13	Metals	Antimony	1	1	mg/kg	U	
CWC165457	CWC003	10/17/13	Metals	Arsenic	7.9	1.6	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Barium	190	0.58	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Cadmium	0.51	0.098	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Chromium	16	2.8	mg/kg	J	H03
CWC165457	CWC003	10/17/13	Metals	Molybdenum	1.6	0.76	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Nickel	8.8	0.66	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Selenium	1.3	0.97	mg/kg	=	
CWC165457	CWC003	10/17/13	Metals	Thallium	0.93	0.93	mg/kg	U	
CWC165457	CWC003	10/17/13	Metals	Vanadium	18	4.5	mg/kg	=	
CWC165459	CWC004	10/17/13	Alpha Spectroscopy	Thorium-228	1.09	0.33	pCi/g	=	
CWC165459	CWC004	10/17/13	Alpha Spectroscopy	Thorium-230	2.15	0.247	pCi/g	J	F01
CWC165459	CWC004	10/17/13	Alpha Spectroscopy	Thorium-232	1.42	0.13	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Actinium-227	0.0299	0.16	pCi/g	UJ	T04, T06

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Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Americium-241	0.00705	0.0366	pCi/g	UJ	T04, T06
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Cesium-137	-0.00327	0.0146	pCi/g	UJ	T04, T06
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Potassium-40	12.3	0.113	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Protactinium-231	-0.0635	0.40	pCi/g	UJ	T04, T06
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Radium-226	1.25	0.0375	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Radium-228	0.62	0.0484	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Thorium-228	0.62	0.0484	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Thorium-230	1.43	3.58	pCi/g	UJ	T04, T06
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Thorium-232	0.616	0.0484	pCi/g	=	
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Uranium-235	0.06	0.22	pCi/g	UJ	T04, T06
CWC165459	CWC004	10/17/13	Gamma Spectroscopy	Uranium-238	1.04	0.351	pCi/g	=	
CWC165459	CWC004	10/17/13	Metals	Antimony	1.1	1.1	mg/kg	U	
CWC165459	CWC004	10/17/13	Metals	Arsenic	32	1.8	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Barium	270	0.64	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Cadmium	0.93	0.11	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Chromium	22	3.1	mg/kg	J	H03
CWC165459	CWC004	10/17/13	Metals	Molybdenum	2.1	0.84	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Nickel	35	0.73	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Selenium	3.9	1.1	mg/kg	=	
CWC165459	CWC004	10/17/13	Metals	Thallium	1	1	mg/kg	U	
CWC165459	CWC004	10/17/13	Metals	Vanadium	61	5	mg/kg	=	
CWC165461	CWC005	10/17/13	Alpha Spectroscopy	Thorium-228	0.82	0.147	pCi/g	J	T04
CWC165461	CWC005	10/17/13	Alpha Spectroscopy	Thorium-230	3.26	0.147	pCi/g	=	
CWC165461	CWC005	10/17/13	Alpha Spectroscopy	Thorium-232	0.49	0.15	pCi/g	J	T04
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Actinium-227	0.0152	0.14	pCi/g	UJ	T04, T06
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Americium-241	0.000172	0.0303	pCi/g	UJ	T04, T06
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Cesium-137	0.00567	0.0124	pCi/g	UJ	T04, T06
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Potassium-40	10.2	0.0989	pCi/g	=	
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Protactinium-231	-0.0784	0.33	pCi/g	UJ	T04, T06
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Radium-226	1.01	0.0322	pCi/g	=	
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Radium-228	0.47	0.0383	pCi/g	=	
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Thorium-228	0.47	0.0383	pCi/g	=	
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Thorium-230	2.47	3.09	pCi/g	UJ	T04, T05
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Thorium-232	0.467	0.0383	pCi/g	=	

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Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Uranium-235	0.04	0.18	pCi/g	UJ	T04, T06
CWC165461	CWC005	10/17/13	Gamma Spectroscopy	Uranium-238	0.58	0.286	pCi/g	J	T04
CWC165461	CWC005	10/17/13	Metals	Antimony	1	1	mg/kg	U	
CWC165461	CWC005	10/17/13	Metals	Arsenic	8.1	1.6	mg/kg	=	
CWC165461	CWC005	10/17/13	Metals	Barium	98	0.57	mg/kg	=	
CWC165461	CWC005	10/17/13	Metals	Cadmium	1.2	0.098	mg/kg	=	
CWC165461	CWC005	10/17/13	Metals	Chromium	49	2.7	mg/kg	J	H03
CWC165461	CWC005	10/17/13	Metals	Molybdenum	1.8	0.76	mg/kg	=	
CWC165461	CWC005	10/17/13	Metals	Nickel	16	0.65	mg/kg	=	
CWC165461	CWC005	10/17/13	Metals	Selenium	0.96	0.96	mg/kg	U	
CWC165461	CWC005	10/17/13	Metals	Thallium	0.93	0.93	mg/kg	U	
CWC165461	CWC005	10/17/13	Metals	Vanadium	23	4.5	mg/kg	=	
CWC165463	CWC006	10/17/13	Alpha Spectroscopy	Thorium-228	1.07	0.33	pCi/g	=	
CWC165463	CWC006	10/17/13	Alpha Spectroscopy	Thorium-230	1.57	0.331	pCi/g	J	F01
CWC165463	CWC006	10/17/13	Alpha Spectroscopy	Thorium-232	0.88	0.15	pCi/g	J	T04
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Actinium-227	0.0598	0.21	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Americium-241	-0.00818	0.0461	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Cesium-137	-0.00297	0.019	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Potassium-40	13.9	0.128	pCi/g	=	
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Protactinium-231	-0.054	0.54	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Radium-226	1.37	0.0479	pCi/g	=	
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Radium-228	0.91	0.0617	pCi/g	=	
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Thorium-228	0.91	0.0617	pCi/g	=	
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Thorium-230	0.126	4.52	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Thorium-232	0.908	0.0617	pCi/g	=	
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Uranium-235	-0.01	0.27	pCi/g	UJ	T04, T06
CWC165463	CWC006	10/17/13	Gamma Spectroscopy	Uranium-238	0.93	0.455	pCi/g	J	T04
CWC165463	CWC006	10/17/13	Metals	Antimony	1.1	1.1	mg/kg	U	
CWC165463	CWC006	10/17/13	Metals	Arsenic	2.2	1.7	mg/kg	=	
CWC165463	CWC006	10/17/13	Metals	Barium	100	0.61	mg/kg	=	
CWC165463	CWC006	10/17/13	Metals	Cadmium	0.18	0.1	mg/kg	=	
CWC165463	CWC006	10/17/13	Metals	Chromium	18	2.9	mg/kg	J	H03
CWC165463	CWC006	10/17/13	Metals	Molybdenum	0.8	0.8	mg/kg	U	
CWC165463	CWC006	10/17/13	Metals	Nickel	17	0.69	mg/kg	=	

Table D-2. Coldwater Creek Sediment Data for CY 2013

Sample Name	Station Name	Collection Date	Method	Analyte	Result	DL	Units	VQ	Validation Reason Code
CWC165463	CWC006	10/17/13	Metals	Selenium	1.9	1	mg/kg	=	
CWC165463	CWC006	10/17/13	Metals	Thallium	0.99	0.99	mg/kg	U	
CWC165463	CWC006	10/17/13	Metals	Vanadium	22	4.8	mg/kg	=	
CWC165484	CWC007	10/17/13	Alpha Spectroscopy	Thorium-228	0.94	0.323	pCi/g	J	T04
CWC165484	CWC007	10/17/13	Alpha Spectroscopy	Thorium-230	4.50	0.323	pCi/g	=	
CWC165484	CWC007	10/17/13	Alpha Spectroscopy	Thorium-232	0.69	0.27	pCi/g	J	T04
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Actinium-227	0.1	0.19	pCi/g	UJ	T04, T06
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Americium-241	0.00829	0.0392	pCi/g	UJ	T04, T06
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Cesium-137	0.0147	0.0177	pCi/g	UJ	T04, T05
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Potassium-40	11.1	0.0991	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Protactinium-231	0.228	0.47	pCi/g	UJ	T04, T06
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Radium-226	1.2	0.0407	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Radium-228	0.54	0.0479	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Thorium-228	0.54	0.0479	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Thorium-230	10.7	3.5	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Thorium-232	0.536	0.0479	pCi/g	=	
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Uranium-235	0.08	0.23	pCi/g	UJ	T04, T06
CWC165484	CWC007	10/17/13	Gamma Spectroscopy	Uranium-238	0.86	0.363	pCi/g	J	T04
CWC165484	CWC007	10/17/13	Metals	Antimony	1.3	1.3	mg/kg	U	
CWC165484	CWC007	10/17/13	Metals	Arsenic	12	2.1	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Barium	230	0.76	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Cadmium	1.4	0.13	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Chromium	80	3.6	mg/kg	J	H03
CWC165484	CWC007	10/17/13	Metals	Molybdenum	8	1	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Nickel	36	0.86	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Selenium	3	1.3	mg/kg	=	
CWC165484	CWC007	10/17/13	Metals	Thallium	1.2	1.2	mg/kg	U	
CWC165484	CWC007	10/17/13	Metals	Vanadium	32	5.9	mg/kg	=	

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APPENDIX E

GROUND-WATER FIELD PARAMETER DATA AND ANALYTICAL DATA RESULTS FOR CY 2013

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Table E-1. Ground-Water Monitoring
First Quarter 2013 - Field Parameters for the Latty Avenue Properties

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 03/04/13
HISS/Futura	HISS-01	03/07/13	120	1,800	6.94	0.135	41.3	6.69	12.2	163	7.85	7.51
HISS/Futura	HISS-06A	---	---	---	---	---	---	---	---	---	---	7.31
HISS/Futura	HISS-10	03/07/13	150	1,800	6.57	0.132	24.7	3.52	11.1	194	5.23	4.66
HISS/Futura	HISS-11A	03/06/13	50	600	6.6	79.8	0.8	3.36	10.8	195	10	9
HISS/Futura	HISS-17S	---	---	---	---	---	---	---	---	---	---	4.68
HISS/Futura	HISS-19S	---	---	---	---	---	---	---	---	---	---	13.24
HISS/Futura	HW22	---	---	---	---	---	---	---	---	---	---	9.94
HISS/Futura	HW23	---	---	---	---	---	---	---	---	---	---	12.65

Table E-1. Ground-Water Monitoring
Second Quarter 2013 - Field Parameters for the Latty Avenue Properties

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 05/17/13
HISS/Futura	HISS-01	---	---	---	---	---	---	---	---	---	---	8.15
HISS/Futura	HISS-06A	---	---	---	---	---	---	---	---	---	---	7.63
HISS/Futura	HISS-10	---	---	---	---	---	---	---	---	---	---	5.74
HISS/Futura	HISS-11A	---	---	---	---	---	---	---	---	---	---	10.03
HISS/Futura	HISS-17S	05/20/13	80	720	6.98	0.18	30.1	7.06	18.9	76	5.46	6.37
HISS/Futura	HISS-19	---	---	---	---	---	---	---	---	---	---	13.72
HISS/Futura	HW22	---	---	---	---	---	---	---	---	---	---	9.99
HISS/Futura	HW23	05/20/13	80	960	6.48	1.13	65.8	5.01	18.3	-157	13.26	12.55

Table E-1. Ground-Water Monitoring
Third Quarter 2013 - Field Parameters for the Latty Avenue Properties

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (μS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 08/26/13
HISS/Futura	HISS-01	08/28/13	120	1,440	6.31	0.173	35	4.97	20.8	210	12.48	12.08
HISS/Futura	HISS-06A	08/29/13	100	1,200	6.31	1.01	30.9	4.09	20.8	-134	9.49	9.31
HISS/Futura	HISS-10	---	---	---	---	---	---	---	---	---	---	8.98
HISS/Futura	HISS-11A	08/29/13	50	600	5.98	0.168	81.3	3.21	19.7	139	13.98	13.42
HISS/Futura	HISS-17S	---	---	---	---	---	---	---	---	---	---	8.38
HISS/Futura	HISS-19	---	---	---	---	---	---	---	---	---	---	14.57
HISS/Futura	HW22	08/29/13	35	525	6.32	1.01	42.6	5.98	19.5	-137	10.36	10.32
HISS/Futura	HW23	---	---	---	---	---	---	---	---	---	---	14.48

Table E-1. Ground-Water Monitoring
Fourth Quarter 2013 - Field Parameters for the Latty Avenue Properties

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 12/03/13
HISS/Futura	HISS-01	---	---	---	---	---	---	---	---	---	---	12.5
HISS/Futura	HISS-06A	---	---	---	---	---	---	---	---	---	---	10.53
HISS/Futura	HISS-10	---	---	---	---	---	---	---	---	---	---	9.54
HISS/Futura	HISS-11A	---	---	---	---	---	---	---	---	---	---	13.06
HISS/Futura	HISS-17S	---	---	---	---	---	---	---	---	---	---	8.98
HISS/Futura	HISS-19	---	---	---	---	---	---	---	---	---	---	14.49
HISS/Futura	HW22	---	---	---	---	---	---	---	---	---	---	10.14
HISS/Futura	HW23	---	---	---	---	---	---	---	---	---	---	14.9

--- monitoring well was not sampled during this event.

No ground-water sampling was conducte at the Latty Avenue Properties during the fourth quarter.

BTOC – Below top of casing

mL/min – milliliters per minute

Table E-2. Ground-Water Monitoring
First Quarter 2013 - Field Parameters for SLAPS and SLAPS VPs

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 03/04/13
SLAPS and SLAPS VPs	B53W01D	---	---	---	---	---	---	---	---	---	---	11.29
SLAPS and SLAPS VPs	B53W01S	---	---	---	---	---	---	---	---	---	---	17.05
SLAPS and SLAPS VPs	B53W06S	---	---	---	---	---	---	---	---	---	---	17
SLAPS and SLAPS VPs	B53W07D	---	---	---	---	---	---	---	---	---	---	11.43
SLAPS and SLAPS VPs	B53W07S	---	---	---	---	---	---	---	---	---	---	21.19
SLAPS and SLAPS VPs	B53W09S	03/08/13	30	360	6.5	0.16	9.7	2.87	13.4	107	17.78	17.04
SLAPS and SLAPS VPs	B53W13S	---	---	---	---	---	---	---	---	---	---	12.46
SLAPS and SLAPS VPs	B53W17S	---	---	---	---	---	---	---	---	---	---	---
SLAPS and SLAPS VPs	B53W18S	03/08/13	92	984	6.38	0.477	40.2	2.29	14.1	167	13.6	13
SLAPS and SLAPS VPs	B53W19S	---	---	---	---	---	---	---	---	---	---	6.08
SLAPS and SLAPS VPs	MW31-98	---	---	---	---	---	---	---	---	---	---	17.1
SLAPS and SLAPS VPs	MW32-98	---	---	---	---	---	---	---	---	---	---	17.29
SLAPS and SLAPS VPs	PW35	---	---	---	---	---	---	---	---	---	---	10
SLAPS and SLAPS VPs	PW36	---	---	---	---	---	---	---	---	---	---	10.62
SLAPS and SLAPS VPs	PW42	---	---	---	---	---	---	---	---	---	---	11.4
SLAPS and SLAPS VPs	PW43	03/08/13	50	450	6.43	0.127	14.7	1.69	14	-113	21.05	20.65
SLAPS and SLAPS VPs	PW44	03/06/13	50	600	6.64	73.6	60.3	4.19	6.9	219	3.81	2.93
SLAPS and SLAPS VPs	PW45	03/06/13	80	1,440	6.31	0.096	85.3	2.31	10.6	235	6.87	6.76
SLAPS and SLAPS VPs	PW46	03/08/13	50	600	6.44	0.112	16.1	4.6	7.5	210	17.32	12.72

Table E-2. Ground-Water Monitoring
Second Quarter 2013 - Field Parameters for SLAPS and SLAPS VPs

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 05/17/13
SLAPS and SLAPS VPs	B53W01D	05/20/13	120	1,800	6.7	0.163	21.1	5.58	17.6	121	11.32	11.27
SLAPS and SLAPS VPs	B53W01S	---	---	---	---	---	---	---	---	---	---	13.17
SLAPS and SLAPS VPs	B53W06S	05/21/13	100	1,500	6.9	0.751	78.2	4.86	16.4	-149	18.62	12.77
SLAPS and SLAPS VPs	B53W07D	---	---	---	---	---	---	---	---	---	---	11.32
SLAPS and SLAPS VPs	B53W07S	---	---	---	---	---	---	---	---	---	---	15.24
SLAPS and SLAPS VPs	B53W09S	---	---	---	---	---	---	---	---	---	---	14.18
SLAPS and SLAPS VPs	B53W13S	05/22/13	60	1,080	6.91	1.13	36.9	4.97	17.6	209	8.6	7.8
SLAPS and SLAPS VPs	B53W17S	---	---	---	---	---	---	---	---	---	---	6.33
SLAPS and SLAPS VPs	B53W18S	05/20/13	92	1,104	6.59	0.171	36.5	5.88	17.9	102	13.6	13.22
SLAPS and SLAPS VPs	B53W19S	---	---	---	---	---	---	---	---	---	---	6.81
SLAPS and SLAPS VPs	MW31-98	---	---	---	---	---	---	---	---	---	---	5.71
SLAPS and SLAPS VPs	MW32-98	---	---	---	---	---	---	---	---	---	---	11.47
SLAPS and SLAPS VPs	PW35	05/20/13	45	1,080	6.6	0.091	43.2	2.31	17.8	64	11.39	10.4
SLAPS and SLAPS VPs	PW36	---	---	---	---	---	---	---	---	---	---	10.53
SLAPS and SLAPS VPs	PW42	---	---	---	---	---	---	---	---	---	---	11.09
SLAPS and SLAPS VPs	PW43	---	---	---	---	---	---	---	---	---	---	10.58
SLAPS and SLAPS VPs	PW44	---	---	---	---	---	---	---	---	---	---	4.24
SLAPS and SLAPS VPs	PW45	---	---	---	---	---	---	---	---	---	---	7.07
SLAPS and SLAPS VPs	PW46	---	---	---	---	---	---	---	---	---	---	11.8

Table E-2. Ground-Water Monitoring
Third Quarter 2013 - Field Parameters for SLAPS and SLAPS VPs

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (μS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 08/26/13
SLAPS and SLAPS VPs	B53W01D	---	---	---	---	---	---	---	---	---	---	11.33
SLAPS and SLAPS VPs	B53W01S	---	---	---	---	---	---	---	---	---	---	17.9
SLAPS and SLAPS VPs	B53W06S	---	---	---	---	---	---	---	---	---	---	15.11
SLAPS and SLAPS VPs	B53W07D	---	---	---	---	---	---	---	---	---	---	11.38
SLAPS and SLAPS VPs	B53W07S	---	---	---	---	---	---	---	---	---	---	18.74
SLAPS and SLAPS VPs	B53W09S	08/28/13	30	360	6.58	0.135	149	2.95	22.4	146	16.93	16.01
SLAPS and SLAPS VPs	B53W13S	---	---	---	---	---	---	---	---	---	---	12.73
SLAPS and SLAPS VPs	B53W17S	---	---	---	---	---	---	---	---	---	---	---
SLAPS and SLAPS VPs	B53W18S	08/28/13	92	1,380	6.22	0.464	58.1	1.04	20.9	-31	13.84	13.42
SLAPS and SLAPS VPs	B53W19S	---	---	---	---	---	---	---	---	---	---	7.44
SLAPS and SLAPS VPs	MW31-98	---	---	---	---	---	---	---	---	---	---	12.07
SLAPS and SLAPS VPs	MW32-98	---	---	---	---	---	---	---	---	---	---	15.41
SLAPS and SLAPS VPs	PW35	---	---	---	---	---	---	---	---	---	---	11.67
SLAPS and SLAPS VPs	PW36	---	---	---	---	---	---	---	---	---	---	10.57
SLAPS and SLAPS VPs	PW42	---	---	---	---	---	---	---	---	---	---	11.3
SLAPS and SLAPS VPs	PW43	08/26/13	50	600	7.2	0.178	49.7	4.36	20.4	168	17.04	16.28
SLAPS and SLAPS VPs	PW44	---	---	---	---	---	---	---	---	---	---	6.18
SLAPS and SLAPS VPs	PW45	---	---	---	---	---	---	---	---	---	---	8.75
SLAPS and SLAPS VPs	PW46	---	---	---	---	---	---	---	---	---	---	15.33

Table E-2. Ground-Water Monitoring
Fourth Quarter 2013 - Field Parameters for SLAPS and SLAPS VPs

Site	Station ID	Date Sampled	Purge Rate (mL/min)	mL Removed (mL)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (°C)	ORP (mV)	Depth to Water at Sampling Time	Depth to Water (BTOC) 12/03/13
SLAPS and SLAPS VPs	B53W01D	---	---	---	---	---	---	---	---	---	---	11.35
SLAPS and SLAPS VPs	B53W01S	---	---	---	---	---	---	---	---	---	---	17.49
SLAPS and SLAPS VPs	B53W06S	12/03/13	22	330	6.8	0.074	25.6	3.22	17.5	138	17.66	16.76
SLAPS and SLAPS VPs	B53W07D	12/03/13	40	480	6.69	0.122	19.6	5.35	16.8	178	11.56	11.46
SLAPS and SLAPS VPs	B53W07S	---	---	---	---	---	---	---	---	---	---	20.21
SLAPS and SLAPS VPs	B53W09S	---	---	---	---	---	---	---	---	---	---	17.06
SLAPS and SLAPS VPs	B53W13S	12/04/13	60	900	6.88	1.16	35.9	5.7	16.2	202	15.31	14.89
SLAPS and SLAPS VPs	B53W17S	12/04/13	53	536	6.56	0.163	41	6.02	15.7	101	15.2	14.93
SLAPS and SLAPS VPs	B53W18S	---	---	---	---	---	---	---	---	---	---	13.43
SLAPS and SLAPS VPs	B53W19S	---	---	---	---	---	---	---	---	---	---	8.33
SLAPS and SLAPS VPs	MW31-98	12/03/13	60	720	6.79	1	22.7	3.88	14.3	-113	17.49	17.11
SLAPS and SLAPS VPs	MW32-98	---	---	---	---	---	---	---	---	---	---	17.96
SLAPS and SLAPS VPs	PW35	---	---	---	---	---	---	---	---	---	---	11.13
SLAPS and SLAPS VPs	PW36	---	---	---	---	---	---	---	---	---	---	10.52
SLAPS and SLAPS VPs	PW42	---	---	---	---	---	---	---	---	---	---	11.5
SLAPS and SLAPS VPs	PW43	---	---	---	---	---	---	---	---	---	---	19
SLAPS and SLAPS VPs	PW44	---	---	---	---	---	---	---	---	---	---	6.58
SLAPS and SLAPS VPs	PW45	---	---	---	---	---	---	---	---	---	---	10.1
SLAPS and SLAPS VPs	PW46	---	---	---	---	---	---	---	---	---	---	15.5

--- monitoring well was not sampled during this event.

Table E-3. CY 2013 Ground-Water Sampling Data for the Latty Avenue Properties

Site: Latty Avenue Properties											
Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ[a]	Validation Reason Code[b]	Filtered
HIS152044	HISS-01	03/07/13	ML-006	Radium-226	0.738	0.871	1.27	pCi/L	UJ	T06	No
HIS152044	HISS-01	03/07/13	ML-005	Thorium-228	0.556	0.463	0.251	pCi/L	J	T04	No
HIS152044	HISS-01	03/07/13	ML-005	Thorium-230	0.417	0.43	0.556	pCi/L	UJ	T06	No
HIS152044	HISS-01	03/07/13	ML-005	Thorium-232	0.0926	0.186	0.251	pCi/L	UJ	T06	No
HIS152044	HISS-01	03/07/13	ML-015	Uranium-234	16.5	4.39	0.257	pCi/L	=		No
HIS152044	HISS-01	03/07/13	ML-015	Uranium-235	0.234	0.44	0.859	pCi/L	UJ	T06	No
HIS152044	HISS-01	03/07/13	ML-015	Uranium-238	15.7	4.23	0.255	pCi/L	=		No
HIS156503	HISS-01	08/28/13	ML-006	Radium-226	1.5	1.14	0.582	pCi/L	J	T04	No
HIS156503	HISS-01	08/28/13	ML-005	Thorium-228	0.473	0.393	0.214	pCi/L	J	T04	No
HIS156503	HISS-01	08/28/13	ML-005	Thorium-230	0.237	0.337	0.581	pCi/L	UJ	T06	No
HIS156503	HISS-01	08/28/13	ML-005	Thorium-232	-0.0394	0.0791	0.473	pCi/L	UJ	T06	No
HIS156503	HISS-01	08/28/13	ML-015	Uranium-234	17.3	4.32	0.48	pCi/L	=		No
HIS156503	HISS-01	08/28/13	ML-015	Uranium-235	2.72	1.2	0.592	pCi/L	=		No
HIS156503	HISS-01	08/28/13	ML-015	Uranium-238	18.5	4.57	0.478	pCi/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Arsenic	1.2		1.2	µg/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Barium	110		0.22	µg/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Cadmium	0.2		0.1	µg/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Molybdenum	4.3		1	µg/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Nickel	7.1		0.4	µg/L	=		No
HIS156504	HISS-06A	08/29/13	ML-006	Radium-226	-2.83E-05	0.6	1.8	pCi/L	UJ	T06	No
HIS156504	HISS-06A	08/29/13	SW846 6020	Selenium	400		1.6	µg/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
HIS156504	HISS-06A	08/29/13	ML-005	Thorium-228	0.187	0.266	0.459	pCi/L	UJ	T06	No
HIS156504	HISS-06A	08/29/13	ML-005	Thorium-230	0.5	0.391	0.46	pCi/L	J	F01, T04	No
HIS156504	HISS-06A	08/29/13	ML-005	Thorium-232	0	0	0.169	pCi/L	U		No
HIS156504	HISS-06A	08/29/13	ML-015	Uranium-234	3.43	1.27	0.573	pCi/L	=		No
HIS156504	HISS-06A	08/29/13	ML-015	Uranium-235	0.144	0.29	0.577	pCi/L	UJ	T06	No
HIS156504	HISS-06A	08/29/13	ML-015	Uranium-238	1.86	0.854	0.21	pCi/L	=		No
HIS156504	HISS-06A	08/29/13	SW846 6020	Vanadium	3.4		2.4	µg/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS152043	HISS-10	03/07/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
HIS152043	HISS-10	03/07/13	SW846 6020	Barium	100		0.22	µg/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Cadmium	0.12		0.1	µg/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
HIS152043	HISS-10	03/07/13	SW846 6020	Molybdenum	21		1	µg/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Nickel	1.1		0.4	µg/L	=		No
HIS152043	HISS-10	03/07/13	ML-006	Radium-226	0.683	0.967	1.68	pCi/L	UJ	T06	No
HIS152043	HISS-10	03/07/13	SW846 6020	Selenium	2.3		1.6	µg/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
HIS152043	HISS-10	03/07/13	ML-005	Thorium-228	0.161	0.228	0.218	pCi/L	UJ	T06	No
HIS152043	HISS-10	03/07/13	ML-005	Thorium-230	0.723	0.494	0.218	pCi/L	J	F01, T04	No
HIS152043	HISS-10	03/07/13	ML-005	Thorium-232	0.0802	0.161	0.217	pCi/L	UJ	T06	No
HIS152043	HISS-10	03/07/13	ML-015	Uranium-234	6.66	2	0.212	pCi/L	=		No
HIS152043	HISS-10	03/07/13	ML-015	Uranium-235	0	0	0.262	pCi/L	U		No

Table E-3. CY 2013 Ground-Water Sampling Data for the Latty Avenue Properties

Site: Latty Avenue Properties											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
HIS152043	HISS-10	03/07/13	ML-015	Uranium-238	5.77	1.8	0.211	pCi/L	=		No
HIS152043	HISS-10	03/07/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Barium	110		0.22	µg/L	=		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Cadmium	0.1		0.1	µg/L	=		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Molybdenum	2.8		1	µg/L	=		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Nickel	0.79		0.4	µg/L	=		No
HIS152045	HISS-11A	03/06/13	ML-006	Radium-226	0.91	0.912	0.617	pCi/L	UJ	T02	No
HIS152045	HISS-11A	03/06/13	SW846 6020	Selenium	5.4		1.6	µg/L	=		No
HIS152045	HISS-11A	03/06/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
HIS152045	HISS-11A	03/06/13	ML-005	Thorium-228	0.48	0.495	0.706	pCi/L	UJ	T06	No
HIS152045	HISS-11A	03/06/13	ML-005	Thorium-230	0.288	0.336	0.26	pCi/L	UJ	T02	No
HIS152045	HISS-11A	03/06/13	ML-005	Thorium-232	0	0	0.26	pCi/L	U		No
HIS152045	HISS-11A	03/06/13	ML-015	Uranium-234	1.51	0.821	0.255	pCi/L	J	T04	No
HIS152045	HISS-11A	03/06/13	ML-015	Uranium-235	0.116	0.233	0.314	pCi/L	UJ	T06	No
HIS152045	HISS-11A	03/06/13	ML-015	Uranium-238	0.936	0.627	0.254	pCi/L	J	T04	No
HIS152045	HISS-11A	03/06/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Barium	110		0.22	µg/L	=		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Cadmium	0.29		0.1	µg/L	=		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Molybdenum	3.4		1	µg/L	=		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Nickel	1.6		0.4	µg/L	=		No
HIS156502	HISS-11A	08/29/13	ML-006	Radium-226	0.705	0.815	0.637	pCi/L	UJ	T02	No
HIS156502	HISS-11A	08/29/13	SW846 6020	Selenium	12		1.6	µg/L	=		No
HIS156502	HISS-11A	08/29/13	SW846 6020	Thallium	0.66		0.55	µg/L	=		No
HIS156502	HISS-11A	08/29/13	ML-005	Thorium-228	0.0471	0.312	0.791	pCi/L	UJ	T06	No
HIS156502	HISS-11A	08/29/13	ML-005	Thorium-230	0.895	0.62	0.565	pCi/L	J	F01, T04	No
HIS156502	HISS-11A	08/29/13	ML-005	Thorium-232	-0.141	0.165	0.791	pCi/L	UJ	T06	No
HIS156502	HISS-11A	08/29/13	ML-015	Uranium-234	1.79	0.832	0.21	pCi/L	=		No
HIS156502	HISS-11A	08/29/13	ML-015	Uranium-235	0.0957	0.193	0.259	pCi/L	UJ	T06	No
HIS156502	HISS-11A	08/29/13	ML-015	Uranium-238	1.31	0.693	0.209	pCi/L	J	T04	No
HIS156502	HISS-11A	08/29/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
HIS154808	HISS-17S	05/20/13	ML-006	Radium-226	0.954	1.1	1.78	pCi/L	UJ	T06	No
HIS154808	HISS-17S	05/20/13	ML-005	Thorium-228	0.0827	0.166	0.331	pCi/L	UJ	T06	No
HIS154808	HISS-17S	05/20/13	ML-005	Thorium-230	0.221	0.223	0.15	pCi/L	UJ	T02	No
HIS154808	HISS-17S	05/20/13	ML-005	Thorium-232	0.0275	0.123	0.33	pCi/L	UJ	T06	No
HIS154808	HISS-17S	05/20/13	ML-015	Uranium-234	0.663	0.44	0.18	pCi/L	J	T04	No
HIS154808	HISS-17S	05/20/13	ML-015	Uranium-235	-0.0409	0.0822	0.491	pCi/L	UJ	T06	No
HIS154808	HISS-17S	05/20/13	ML-015	Uranium-238	0.429	0.366	0.396	pCi/L	J	T04	No
HIS156505	HW22	08/29/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS156505	HW22	08/29/13	SW846 6020	Arsenic	130		1.2	µg/L	=		No
HIS156505	HW22	08/29/13	SW846 6020	Barium	430		0.22	µg/L	=		No

Table E-3. CY 2013 Ground-Water Sampling Data for the Latty Avenue Properties

Site: Latty Avenue Properties											
Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ[a]	Validation Reason Code[b]	Filtered
HIS156505	HW22	08/29/13	SW846 6020	Cadmium	0.13		0.1	µg/L	=		No
HIS156505	HW22	08/29/13	SW846 6020	Chromium	4.6		3.3	µg/L	=		No
HIS156505	HW22	08/29/13	SW846 6020	Molybdenum	6.5		1	µg/L	=		No
HIS156505	HW22	08/29/13	SW846 6020	Nickel	6.4		0.4	µg/L	=		No
HIS156505	HW22	08/29/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
HIS156505	HW22	08/29/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
HIS156505	HW22	08/29/13	SW846 6020	Vanadium	7.6		2.4	µg/L	=		No
HIS154807	HW23	05/20/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
HIS154807	HW23	05/20/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
HIS154807	HW23	05/20/13	SW846 6020	Barium	220		0.22	µg/L	=		No
HIS154807	HW23	05/20/13	SW846 6020	Cadmium	1.1		0.1	µg/L	=		No
HIS154807	HW23	05/20/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
HIS154807	HW23	05/20/13	SW846 6020	Molybdenum	1		1	µg/L	U		No
HIS154807	HW23	05/20/13	SW846 6020	Nickel	6.8		0.4	µg/L	=		No
HIS154807	HW23	05/20/13	ML-006	Radium-226	0.278	0.556	0.753	pCi/L	UJ	T06	No
HIS154807	HW23	05/20/13	SW846 6020	Selenium	1.9		1.6	µg/L	=		No
HIS154807	HW23	05/20/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
HIS154807	HW23	05/20/13	ML-005	Thorium-228	0.156	0.227	0.375	pCi/L	UJ	T06	No
HIS154807	HW23	05/20/13	ML-005	Thorium-230	0.282	0.29	0.376	pCi/L	UJ	T06	No
HIS154807	HW23	05/20/13	ML-005	Thorium-232	0	0	0.17	pCi/L	U		No
HIS154807	HW23	05/20/13	ML-015	Uranium-234	6.62	1.92	0.425	pCi/L	=		No
HIS154807	HW23	05/20/13	ML-015	Uranium-235	0.0437	0.196	0.524	pCi/L	UJ	T06	No
HIS154807	HW23	05/20/13	ML-015	Uranium-238	2.26	0.92	0.191	pCi/L	=		No
HIS154807	HW23	05/20/13	SW846 6020	Vanadium	2.6		2.4	µg/L	=		No

[a] VQs:

= Indicates that the data met all QA/QC requirements, and that the parameter has been positively identified and the associated concentration value is accurate.

J Indicates that the parameter was positively identified; the associated numerical value is the approximate concentration of the parameter in the sample.

U Indicates that the data met all QA/QC requirements, and that the parameter was analyzed for but was not detected above the reported sample quantitation limit.

UJ Indicates that the parameter was not detected above the reported sample quantitation limit.and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. However, the reported quantitation limit is approximate.

[b] Validation Reason Codes:

F01 Blanks: Sample data were qualified as a result of the method blank.

T02 Radionuclide Quantitation: Analytical uncertainties were not met and/or not reported.

T04 Radionuclide Quantitation: Professional judgment was used to qualify the data.

T06 Radionuclide Quantitation: Analytical result is less than both the associated counting uncertainty and MDA.

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SLA154802	B53W01D	05/20/13	ML-006	Radium-226	2.07	1.49	1.69	pCi/L	J	T04	No
SLA154802	B53W01D	05/20/13	ML-005	Thorium-228	0.834	0.55	0.558	pCi/L	J	F01, T04	No
SLA154802	B53W01D	05/20/13	ML-005	Thorium-230	0.266	0.41	0.763	pCi/L	UJ	T06	No
SLA154802	B53W01D	05/20/13	ML-005	Thorium-232	0.0379	0.169	0.454	pCi/L	UJ	T06	No
SLA154802	B53W01D	05/20/13	ML-015	Uranium-234	0.0555	0.111	0.15	pCi/L	UJ	T06	No
SLA154802	B53W01D	05/20/13	ML-015	Uranium-235	0.0684	0.137	0.185	pCi/L	UJ	T06	No
SLA154802	B53W01D	05/20/13	ML-015	Uranium-238	0	0	0.15	pCi/L	U		No
SLA154806	B53W06S	05/21/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA154806	B53W06S	05/21/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SLA154806	B53W06S	05/21/13	SW846 6020	Barium	62		0.22	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Cadmium	2.3		0.1	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Chromium	57		3.3	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Molybdenum	8.1		1	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Nickel	3.9		0.4	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Selenium	2.9		1.6	µg/L	=		No
SLA154806	B53W06S	05/21/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA154806	B53W06S	05/21/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP166406	B53W06S	12/03/13	SW846 6020	Antimony	8.4		8.4	µg/L	U		No
SVP166406	B53W06S	12/03/13	SW846 6020	Arsenic	5.9		5.9	µg/L	U		No
SVP166406	B53W06S	12/03/13	SW846 6020	Barium	83		1.1	µg/L	=		No
SVP166406	B53W06S	12/03/13	SW846 6020	Cadmium	1.7		0.5	µg/L	=		No
SVP166406	B53W06S	12/03/13	SW846 6020	Chromium	32		16	µg/L	=		No
SVP166406	B53W06S	12/03/13	SW846 6020	Molybdenum	13		5	µg/L	=		No
SVP166406	B53W06S	12/03/13	SW846 6020	Nickel	15		2	µg/L	=		No
SVP166406	B53W06S	12/03/13	SW846 6020	Selenium	8		8	µg/L	U		No
SVP166406	B53W06S	12/03/13	SW846 6020	Thallium	2.8		2.8	µg/L	U	D02	No
SVP166406	B53W06S	12/03/13	SW846 6020	Vanadium	12		12	µg/L	U		No
SVP166408	B53W07D	12/03/13	SW846 6020	Antimony	8.4		8.4	µg/L	U		No
SVP166408	B53W07D	12/03/13	SW846 6020	Arsenic	110		5.9	µg/L	=		No
SVP166408	B53W07D	12/03/13	SW846 6020	Barium	440		1.1	µg/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SVP166408	B53W07D	12/03/13	SW846 6020	Cadmium	0.58		0.5	µg/L	=		No
SVP166408	B53W07D	12/03/13	SW846 6020	Chromium	16		16	µg/L	U		No
SVP166408	B53W07D	12/03/13	SW846 6020	Molybdenum	5		5	µg/L	U		No
SVP166408	B53W07D	12/03/13	SW846 6020	Nickel	16		2	µg/L	=		No
SVP166408	B53W07D	12/03/13	ML-006	Radium-226	0.493	0.924	1.82	pCi/L	UJ	T06	No
SVP166408	B53W07D	12/03/13	SW846 6020	Selenium	8		8	µg/L	U		No
SVP166408	B53W07D	12/03/13	SW846 6020	Thallium	2.8		2.8	µg/L	U	D02	No
SVP166408	B53W07D	12/03/13	ML-005	Thorium-228	0.32	0.329	0.426	pCi/L	UJ	T06	No
SVP166408	B53W07D	12/03/13	ML-005	Thorium-230	0.355	0.322	0.193	pCi/L	J	F01, T04	No
SVP166408	B53W07D	12/03/13	ML-005	Thorium-232	0.106	0.213	0.426	pCi/L	UJ	T06	No
SVP166408	B53W07D	12/03/13	ML-015	Uranium-234	0.124	0.25	0.497	pCi/L	UJ	T06	No
SVP166408	B53W07D	12/03/13	ML-015	Uranium-235	0	0	0.277	pCi/L	U		No
SVP166408	B53W07D	12/03/13	ML-015	Uranium-238	0.165	0.236	0.224	pCi/L	UJ	T06	No
SVP166408	B53W07D	12/03/13	SW846 6020	Vanadium	12		12	µg/L	U		No
SLA152051	B53W09S	03/08/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA152051	B53W09S	03/08/13	SW846 6020	Arsenic	1.2		1.2	µg/L	J	F01	No
SLA152051	B53W09S	03/08/13	SW846 6020	Barium	340		0.22	µg/L	=		No
SLA152051	B53W09S	03/08/13	SW846 6020	Cadmium	0.5		0.1	µg/L	=		No
SLA152051	B53W09S	03/08/13	SW846 6020	Chromium	10		3.3	µg/L	=		No
SLA152051	B53W09S	03/08/13	SW846 6020	Molybdenum	4.6		1	µg/L	=		No
SLA152051	B53W09S	03/08/13	SW846 6020	Nickel	37		0.4	µg/L	=		No
SLA152051	B53W09S	03/08/13	ML-006	Radium-226	0.305	0.61	1.22	pCi/L	UJ	T06	No
SLA152051	B53W09S	03/08/13	SW846 6020	Selenium	9.3		1.6	µg/L	=		No
SLA152051	B53W09S	03/08/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA152051	B53W09S	03/08/13	ML-005	Thorium-228	0.0304	0.202	0.511	pCi/L	UJ	T06	No
SLA152051	B53W09S	03/08/13	ML-005	Thorium-230	0.669	0.414	0.165	pCi/L	J	F01, T04	No
SLA152051	B53W09S	03/08/13	ML-005	Thorium-232	0.0304	0.136	0.364	pCi/L	UJ	T06	No
SLA152051	B53W09S	03/08/13	ML-015	Uranium-234	2.05	1.08	0.663	pCi/L	J	T04	No
SLA152051	B53W09S	03/08/13	ML-015	Uranium-235	0.682	0.63	0.37	pCi/L	J	T04	No
SLA152051	B53W09S	03/08/13	ML-015	Uranium-238	2.31	1.14	0.298	pCi/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ[a]	Validation Reason Code[b]	Filtered
SLA152051	B53W09S	03/08/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP156509	B53W09S	08/28/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SVP156509	B53W09S	08/28/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SVP156509	B53W09S	08/28/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Barium	310		0.22	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Barium	310		0.22	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Cadmium	2.6		0.1	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Cadmium	0.46		0.1	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Chromium	37		3.3	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Chromium	21		3.3	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Molybdenum	6.6		1	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Molybdenum	5.4		1	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Nickel	14		0.4	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Nickel	13		0.4	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Selenium	11		1.6	µg/L	=		No
SVP156509	B53W09S	08/28/13	SW846 6020	Selenium	12		1.6	µg/L	=		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SVP156509	B53W09S	08/28/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		Yes
SVP156509	B53W09S	08/28/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP156509	B53W09S	08/28/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		Yes
SLA154804	B53W13S	05/22/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA154804	B53W13S	05/22/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SLA154804	B53W13S	05/22/13	SW846 6020	Barium	320		0.22	µg/L	=		No
SLA154804	B53W13S	05/22/13	SW846 6020	Cadmium	1		0.1	µg/L	=		No
SLA154804	B53W13S	05/22/13	SW846 6020	Chromium	59		3.3	µg/L	=		No
SLA154804	B53W13S	05/22/13	SW846 6020	Molybdenum	4		1	µg/L	=		No
SLA154804	B53W13S	05/22/13	SW846 6020	Nickel	320		0.4	µg/L	=		No
SLA154804	B53W13S	05/22/13	ML-006	Radium-226	2.85	1.54	1.18	pCi/L	J	T04	No
SLA154804	B53W13S	05/22/13	SW846 6020	Selenium	100		1.6	µg/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SLA154804	B53W13S	05/22/13	SW846 6020	Thallium	0.62		0.55	µg/L	=		No
SLA154804	B53W13S	05/22/13	ML-005	Thorium-228	0.24	0.285	0.411	pCi/L	UJ	T06	No
SLA154804	B53W13S	05/22/13	ML-005	Thorium-230	0.24	0.285	0.411	pCi/L	UJ	T06	No
SLA154804	B53W13S	05/22/13	ML-005	Thorium-232	-6.34E-06	0.168	0.504	pCi/L	UJ	T06	No
SLA154804	B53W13S	05/22/13	ML-015	Uranium-234	10.9	2.77	0.181	pCi/L	=		No
SLA154804	B53W13S	05/22/13	ML-015	Uranium-235	0.495	0.416	0.224	pCi/L	J	T04	No
SLA154804	B53W13S	05/22/13	ML-015	Uranium-238	9.43	2.46	0.4	pCi/L	=		No
SLA154804	B53W13S	05/22/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP166407	B53W13S	12/04/13	SW846 6020	Antimony	8.4		8.4	µg/L	U		No
SVP166407	B53W13S	12/04/13	SW846 6020	Arsenic	5.9		5.9	µg/L	U		No
SVP166407	B53W13S	12/04/13	SW846 6020	Barium	460		1.1	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Cadmium	1.1		0.5	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Chromium	83		16	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Molybdenum	5.9		5	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Nickel	470		2	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Selenium	120		8	µg/L	=		No
SVP166407	B53W13S	12/04/13	SW846 6020	Thallium	2.8		2.8	µg/L	U	D02	No
SVP166407	B53W13S	12/04/13	SW846 6020	Vanadium	12		12	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Antimony	8.4		8.4	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Arsenic	5.9		5.9	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Barium	380		1.1	µg/L	=		No
SVP166409	B53W17S	12/04/13	SW846 6020	Cadmium	0.5		0.5	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Chromium	16		16	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Molybdenum	5		5	µg/L	U		No
SVP166409	B53W17S	12/04/13	SW846 6020	Nickel	3.3		2	µg/L	=		No
SVP166409	B53W17S	12/04/13	ML-006	Radium-226	0.244	0.488	0.661	pCi/L	UJ	T06	No
SVP166409	B53W17S	12/04/13	SW846 6020	Selenium	88		8	µg/L	=		No
SVP166409	B53W17S	12/04/13	SW846 6020	Thallium	2.8		2.8	µg/L	U	D02	No
SVP166409	B53W17S	12/04/13	ML-005	Thorium-228	0.236	0.336	0.58	pCi/L	UJ	T06	No
SVP166409	B53W17S	12/04/13	ML-005	Thorium-230	0.394	0.406	0.58	pCi/L	UJ	T06	No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SVP166409	B53W17S	12/04/13	ML-005	Thorium-232	0.0787	0.158	0.213	pCi/L	UJ	T06	No
SVP166409	B53W17S	12/04/13	ML-015	Uranium-234	3.39	1.31	0.236	pCi/L	=		No
SVP166409	B53W17S	12/04/13	ML-015	Uranium-235	0.322	0.378	0.291	pCi/L	UJ	T02	No
SVP166409	B53W17S	12/04/13	ML-015	Uranium-238	3.2	1.26	0.235	pCi/L	=		No
SVP166409	B53W17S	12/04/13	SW846 6020	Vanadium	12		12	µg/L	U		No
SLA152052	B53W18S	03/08/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA152052	B53W18S	03/08/13	SW846 6020	Arsenic	2.3		1.2	µg/L	J	F01	No
SLA152052	B53W18S	03/08/13	SW846 6020	Barium	520		0.22	µg/L	=		No
SLA152052	B53W18S	03/08/13	SW846 6020	Cadmium	1		0.1	µg/L	=		No
SLA152052	B53W18S	03/08/13	SW846 6020	Chromium	140		3.3	µg/L	=		No
SLA152052	B53W18S	03/08/13	SW846 6020	Molybdenum	32		1	µg/L	=		No
SLA152052	B53W18S	03/08/13	SW846 6020	Nickel	580		0.4	µg/L	=		No
SLA152052	B53W18S	03/08/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SLA152052	B53W18S	03/08/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA152052	B53W18S	03/08/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SLA154805	B53W18S	05/20/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA154805	B53W18S	05/20/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SLA154805	B53W18S	05/20/13	SW846 6020	Barium	520		0.22	µg/L	=		No
SLA154805	B53W18S	05/20/13	SW846 6020	Cadmium	0.57		0.1	µg/L	=		No
SLA154805	B53W18S	05/20/13	SW846 6020	Chromium	140		3.3	µg/L	=		No
SLA154805	B53W18S	05/20/13	SW846 6020	Molybdenum	29		1	µg/L	=		No
SLA154805	B53W18S	05/20/13	SW846 6020	Nickel	730		0.4	µg/L	=		No
SLA154805	B53W18S	05/20/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SLA154805	B53W18S	05/20/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA154805	B53W18S	05/20/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP156508	B53W18S	08/28/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SVP156508	B53W18S	08/28/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Arsenic	1.8		1.2	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Barium	570		0.22	µg/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ[a]	Validation Reason Code[b]	Filtered
SVP156508	B53W18S	08/28/13	SW846 6020	Barium	570		0.22	µg/L	=		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Cadmium	0.29		0.1	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Cadmium	0.2		0.1	µg/L	=		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Chromium	35		3.3	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Molybdenum	16		1	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Molybdenum	14		1	µg/L	=		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Nickel	520		0.4	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Nickel	490		0.4	µg/L	=		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SVP156508	B53W18S	08/28/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Thallium	0.76		0.55	µg/L	=		No
SVP156508	B53W18S	08/28/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		Yes
SVP156508	B53W18S	08/28/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SVP156508	B53W18S	08/28/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		Yes
SVP166410	MW31-98	12/03/13	SW846 6020	Antimony	8.4		8.4	µg/L	U		No
SVP166410	MW31-98	12/03/13	SW846 6020	Arsenic	5.9		5.9	µg/L	U		No
SVP166410	MW31-98	12/03/13	SW846 6020	Barium	400		1.1	µg/L	=		No
SVP166410	MW31-98	12/03/13	SW846 6020	Cadmium	0.5		0.5	µg/L	U		No
SVP166410	MW31-98	12/03/13	SW846 6020	Chromium	16		16	µg/L	U		No
SVP166410	MW31-98	12/03/13	SW846 6020	Molybdenum	5		5	µg/L	U		No
SVP166410	MW31-98	12/03/13	SW846 6020	Nickel	2		2	µg/L	=		No
SVP166410	MW31-98	12/03/13	ML-006	Radium-226	-0.215	0.304	1.58	pCi/L	UJ	T06	No
SVP166410	MW31-98	12/03/13	SW846 6020	Selenium	68		8	µg/L	=		No
SVP166410	MW31-98	12/03/13	SW846 6020	Thallium	2.8		2.8	µg/L	U	D02	No
SVP166410	MW31-98	12/03/13	ML-005	Thorium-228	0.0923	0.185	0.369	pCi/L	UJ	T06	No
SVP166410	MW31-98	12/03/13	ML-005	Thorium-230	0.339	0.312	0.37	pCi/L	U	T04, T05	No
SVP166410	MW31-98	12/03/13	ML-005	Thorium-232	0	0	0.167	pCi/L	U		No
SVP166410	MW31-98	12/03/13	ML-015	Uranium-234	4.74	1.88	0.321	pCi/L	=		No
SVP166410	MW31-98	12/03/13	ML-015	Uranium-235	0.146	0.294	0.396	pCi/L	UJ	T06	No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SVP166410	MW31-98	12/03/13	ML-015	Uranium-238	3.25	1.47	0.708	pCi/L	=		No
SVP166410	MW31-98	12/03/13	SW846 6020	Vanadium	12		12	µg/L	U		No
SLA154803	PW35	05/20/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA154803	PW35	05/20/13	SW846 6020	Arsenic	10		1.2	µg/L	=		No
SLA154803	PW35	05/20/13	SW846 6020	Barium	1,400		0.22	µg/L	=		No
SLA154803	PW35	05/20/13	SW846 6020	Cadmium	0.25		0.1	µg/L	=		No
SLA154803	PW35	05/20/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
SLA154803	PW35	05/20/13	SW846 6020	Molybdenum	4.5		1	µg/L	=		No
SLA154803	PW35	05/20/13	SW846 6020	Nickel	2.4		0.4	µg/L	=		No
SLA154803	PW35	05/20/13	ML-006	Radium-226	0.212	0.424	0.574	pCi/L	UJ	T06	No
SLA154803	PW35	05/20/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SLA154803	PW35	05/20/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA154803	PW35	05/20/13	ML-005	Thorium-228	0.257	0.355	0.618	pCi/L	UJ	T06	No
SLA154803	PW35	05/20/13	ML-005	Thorium-230	0.405	0.373	0.441	pCi/L	U	T04, T05	No
SLA154803	PW35	05/20/13	ML-005	Thorium-232	-0.0367	0.0737	0.441	pCi/L	UJ	T06	No
SLA154803	PW35	05/20/13	ML-015	Uranium-234	-0.03	0.0602	0.36	pCi/L	UJ	T06	No
SLA154803	PW35	05/20/13	ML-015	Uranium-235	0	0	0.2	pCi/L	U		No
SLA154803	PW35	05/20/13	ML-015	Uranium-238	-0.0298	0.06	0.358	pCi/L	UJ	T06	No
SLA154803	PW35	05/20/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SLA152053	PW43	03/08/13	ML-006	Radium-226	0.386	0.546	0.523	pCi/L	UJ	T06	No
SLA152053	PW43	03/08/13	ML-005	Thorium-228	0.215	0.251	0.195	pCi/L	UJ	T02	No
SLA152053	PW43	03/08/13	ML-005	Thorium-230	0.755	0.495	0.431	pCi/L	J	F01, T04	No
SLA152053	PW43	03/08/13	ML-005	Thorium-232	0.144	0.204	0.195	pCi/L	UJ	T06	No
SLA152053	PW43	03/08/13	ML-015	Uranium-234	6.73	2.19	0.261	pCi/L	=		No
SLA152053	PW43	03/08/13	ML-015	Uranium-235	0.237	0.34	0.321	pCi/L	UJ	T06	No
SLA152053	PW43	03/08/13	ML-015	Uranium-238	5.27	1.84	0.259	pCi/L	=		No
SVP156510	PW43	08/26/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SVP156510	PW43	08/26/13	SW846 6020	Arsenic	2.8		1.2	µg/L	=		No
SVP156510	PW43	08/26/13	SW846 6020	Barium	200		0.22	µg/L	=		No
SVP156510	PW43	08/26/13	SW846 6020	Cadmium	1.2		0.1	µg/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ**[a]	**Validation Reason Code**[b]	**Filtered**
SVP156510	PW43	08/26/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
SVP156510	PW43	08/26/13	SW846 6020	Molybdenum	1.9		1	µg/L	=		No
SVP156510	PW43	08/26/13	SW846 6020	Nickel	8.2		0.4	µg/L	=		No
SVP156510	PW43	08/26/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SVP156510	PW43	08/26/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SVP156510	PW43	08/26/13	SW846 6020	Vanadium	2.4		2.4	µg/L	=		No
SLA152048	PW44	03/06/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA152048	PW44	03/06/13	SW846 6020	Arsenic	1.8		1.2	µg/L	J	F01	No
SLA152048	PW44	03/06/13	SW846 6020	Barium	84		0.22	µg/L	=		No
SLA152048	PW44	03/06/13	SW846 6020	Cadmium	0.13		0.1	µg/L	=		No
SLA152048	PW44	03/06/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
SLA152048	PW44	03/06/13	SW846 6020	Molybdenum	1.9		1	µg/L	=		No
SLA152048	PW44	03/06/13	SW846 6020	Nickel	0.62		0.4	µg/L	=		No
SLA152048	PW44	03/06/13	ML-006	Radium-226	1.22E-05	0.644	1.94	pCi/L	UJ	T06	No
SLA152048	PW44	03/06/13	SW846 6020	Selenium	1.6		1.6	µg/L	U		No
SLA152048	PW44	03/06/13	SW846 6020	Thallium	0.55		0.55	µg/L	=		No
SLA152048	PW44	03/06/13	ML-005	Thorium-228	0.243	0.287	0.447	pCi/L	UJ	T06	No
SLA152048	PW44	03/06/13	ML-005	Thorium-230	1	0.523	0.364	pCi/L	J	F01, T04	No
SLA152048	PW44	03/06/13	ML-005	Thorium-232	0.0607	0.122	0.164	pCi/L	UJ	T06	No
SLA152048	PW44	03/06/13	ML-015	Uranium-234	0.513	0.402	0.199	pCi/L	J	T04	No
SLA152048	PW44	03/06/13	ML-015	Uranium-235	0	0	0.245	pCi/L	U		No
SLA152048	PW44	03/06/13	ML-015	Uranium-238	0.584	0.43	0.198	pCi/L	J	T04	No
SLA152048	PW44	03/06/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SLA152049	PW45	03/06/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA152049	PW45	03/06/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SLA152049	PW45	03/06/13	SW846 6020	Barium	67		0.22	µg/L	=		No
SLA152049	PW45	03/06/13	SW846 6020	Cadmium	0.17		0.1	µg/L	=		No
SLA152049	PW45	03/06/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
SLA152049	PW45	03/06/13	SW846 6020	Molybdenum	90		1	µg/L	=		No
SLA152049	PW45	03/06/13	SW846 6020	Nickel	2.3		0.4	µg/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs											
Sample Name	**Station Name**	**Collection Date**	**Method**	**Analyte**	**Result**	**Measurement Error**	**DL**	**Units**	**VQ[a]**	**Validation Reason Code[b]**	**Filtered**
SLA152049	PW45	03/06/13	ML-006	Radium-226	0	0	0.557	pCi/L	U		No
SLA152049	PW45	03/06/13	SW846 6020	Selenium	44		1.6	µg/L	=		No
SLA152049	PW45	03/06/13	SW846 6020	Thallium	0.84		0.55	µg/L	=		No
SLA152049	PW45	03/06/13	ML-005	Thorium-228	0.228	0.33	0.546	pCi/L	UJ	T06	No
SLA152049	PW45	03/06/13	ML-005	Thorium-230	0.73	0.529	0.247	pCi/L	J	F01, T04	No
SLA152049	PW45	03/06/13	ML-005	Thorium-232	0	0	0.247	pCi/L	U		No
SLA152049	PW45	03/06/13	ML-015	Uranium-234	4.04	1.45	0.228	pCi/L	=		No
SLA152049	PW45	03/06/13	ML-015	Uranium-235	0.831	0.613	0.282	pCi/L	J	T04	No
SLA152049	PW45	03/06/13	ML-015	Uranium-238	3.35	1.28	0.227	pCi/L	=		No
SLA152049	PW45	03/06/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No
SLA152050	PW46	03/08/13	SW846 6020	Antimony	1.7		1.7	µg/L	U		No
SLA152050	PW46	03/08/13	SW846 6020	Arsenic	1.2		1.2	µg/L	U		No
SLA152050	PW46	03/08/13	SW846 6020	Barium	56		0.22	µg/L	=		No
SLA152050	PW46	03/08/13	SW846 6020	Cadmium	0.15		0.1	µg/L	=		No
SLA152050	PW46	03/08/13	SW846 6020	Chromium	3.3		3.3	µg/L	U		No
SLA152050	PW46	03/08/13	SW846 6020	Molybdenum	1		1	µg/L	U		No
SLA152050	PW46	03/08/13	SW846 6020	Nickel	0.67		0.4	µg/L	=		No
SLA152050	PW46	03/08/13	ML-006	Radium-226	0.217	0.686	1.6	pCi/L	UJ	T06	No
SLA152050	PW46	03/08/13	SW846 6020	Selenium	42		1.6	µg/L	=		No
SLA152050	PW46	03/08/13	SW846 6020	Thallium	0.55		0.55	µg/L	U		No
SLA152050	PW46	03/08/13	ML-005	Thorium-228	0.0319	0.212	0.536	pCi/L	UJ	T06	No
SLA152050	PW46	03/08/13	ML-005	Thorium-230	0.702	0.435	0.173	pCi/L	J	F01, T04	No
SLA152050	PW46	03/08/13	ML-005	Thorium-232	0.0637	0.128	0.173	pCi/L	UJ	T06	No
SLA152050	PW46	03/08/13	ML-015	Uranium-234	1,000	223	0.856	pCi/L	=		No
SLA152050	PW46	03/08/13	ML-015	Uranium-235	44.4	12.8	1.06	pCi/L	=		No

Table E-4. CY 2013 Ground-Water Sampling Data for the SLAPS and SLAPS VPs

Site: SLAPS and SLAPS VPs

Sample Name	Station Name	Collection Date	Method	Analyte	Result	Measurement Error	DL	Units	VQ[a]	Validation Reason Code[b]	Filtered
SLA152050	PW46	03/08/13	ML-015	Uranium-238	1,030	230	0.852	pCi/L	=		No
SLA152050	PW46	03/08/13	SW846 6020	Vanadium	2.4		2.4	µg/L	U		No

[a] VQs:

= Indicates that the data met all QA/QC requirements, and that the parameter has been positively identified and the associated concentration value is accurate.

J Indicates that the parameter was positively identified; the associated numerical value is the approximate concentration of the parameter in the sample.

U Indicates that the data met all QA/QC requirements, and that the parameter was analyzed for but was not detected above the reported sample quantitation limit.

UJ Indicates that the parameter was not detected above the reported sample quantitation limit.and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. However, the reported quantitation limit is approximate.

[b] Validation Reason Codes:

D02 Initial calibration verification (ICV) recovery was above upper control limit.

F01 Blanks: Sample data were qualified as a result of the method blank.

T02 Radionuclide Quantitation: Analytical uncertainties were not met and/or not reported.

T04 Radionuclide Quantitation: Professional judgment was used to qualify the data.

T05 Radionuclide Quantitation: Analytical result is less than the associated MDA, but greater than the counting uncertainty.

T06 Radionuclide Quantitation: Analytical result is less than both the associated counting uncertainty and MDA.

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APPENDIX F

CALCULATION OF THE RECORD OF DECISION GROUND-WATER EVALUATION GUIDELINES

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CALCULATION OF THE RECORD OF DECISION GROUND-WATER MONITORING GUIDELINES

This appendix briefly outlines the methodology used to develop the ground-water monitoring guidelines for select wells and analytes at the NC Sites. The development of these guidelines was necessary to meet the requirements of response-action monitoring and long-term monitoring specified in the ROD (USACE 2005). These requirements are also identified in the EMICY13 (USACE 2012). The results of these calculations are used in the EMDAR to evaluate ground-water monitoring data at the Latty Avenue Properties and the SLAPS and SLAPS VPs for CY 2013.

INTRODUCTION

Response-action monitoring is conducted for HZ-A and HZ-C ground water at the NC Sites to assess if water quality has improved due to source removals or if ground-water conditions have significantly degraded. Based on the ROD, 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 historical 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 of the mean (based on the historical concentration before remedial activity) 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 (USACE 2005).

In addition to the previous requirements, the ROD specifies that the maximum contaminant level for total U of 30 µg/L be used as a monitoring guideline for both the response-action and long-term monitoring of ground water. If ground-water monitoring indicates the presence of COCs at significantly increased concentrations and total U significantly above 30 µg/L, then an evaluation of potential response actions would be conducted.

METHODOLOGY

In order to evaluate ground water for significant degradation, the UCL must be calculated using the historical ground-water data (i.e., data collected before remedial activity). The UCL is used to represent a historical average concentration for an analyte in a particular well. As stated in the USEPA's *Supplemental Guidance to RAGS: Calculating the Concentration Term,* "because of the uncertainty associated with estimating the true average concentration at a site, the UCL_{95} of the arithmetic mean should be used for this variable" (USEPA 1992). Based on the previously specified guidance, a 95 percent confidence interval was used in the UCL calculations.

Consistent with the ROD, UCL_{95} values for the soil COCs are used in the CY 2013 EMDAR to evaluate if concentrations have statistically increased in ground water for more than a 12-month period. The soil COCs defined in the ROD include antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, total U, vanadium, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. Because the SLAPS well PW46 is a replacement well, pre-2006 data from PW38 was used to develop the ground-water monitoring guideline to compare with the PW46 results. PW46 was installed in April of 2006 near the former location of PW38 and is screened across the same interval. Similarly, pre-2006 data from

HISS-06 and HISS-11 were used to develop the ground-water monitoring guidelines for the two replacement wells (HISS-06A and HISS-11A) installed in CY 2011 at the HISS. For wells located in areas in which a response action has been taken, significant degradation is defined as occurring if the concentration of any COC in a recent sample from that well is double its UCL_{95}, and the total U is significantly above 30 µg/L. The ROD ground-water monitoring guideline for the soil COC for a particular well is defined as equivalent to two times the UCL_{95} value.

The dataset used for this evaluation was reduced prior to performing the statistical analysis. Filtered data, results qualified with an "R" designation, and QC samples were removed from each of the datasets. The analytical result was used when the VQ was assigned an "=" or a "J". For nondetect chemical data (i.e., the VQ was assigned a "U" or "UJ"), the value used in the UCL_{95} calculation was half the DL. For nondetect radiological data, the reported value was used, except in cases in which the value reported was negative. In those cases, a value of zero was substituted for the negative value.

RESULTS

The USEPA software package ProUCL (Version 4.0) was used to calculate the UCL_{95} value. ProUCL computes parametric UCLs (for normal, lognormal, and gamma distributions) and nonparametric UCLs using several nonparametric methods (USEPA 2004). Based upon the data distribution and the associated skewness, ProUCL performs and recommends the appropriate UCL.

The UCL_{95} values are those recommended by ProUCL with the following exceptions.

- If the calculated UCL_{95} exceeded the maximum detected value, then the maximum detected value was used, as recommended in the USEPA's *Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A)* (USEPA 1989d).
- If no values were detected for the COC in the historical database for that well, then the UCL_{95} was not determined. If there were only one detected value of the COC, then the detected value was used.

The ground-water monitoring guidelines based on these UCL_{95} values are listed in Tables F-1 and F-2 for the Latty Avenue Properties and the SLAPS and SLAPS VPs, respectively.

Table F-1. ROD Monitoring Guidelines for Ground Water at the Latty Avenue Properties

Analyte Type	Soil COCs	HISS-01	HISS-06A[a]	HISS-09	HISS-10	HISS-11A[a]	HISS-14
Inorganics (µg/L)	Antimony	12	---	---	---	---	---
	Arsenic	---	---	---	---	5.2	---
	Barium	250	240	420	270	370	1,080
	Cadmium	---	---	---	1.4	---	---
	Chromium	13	2.2	---	2.4	7.0	---
	Molybdenum	23	40	22	5.6	4.8	---
	Nickel	20	34	21	3.8	20	11
	Selenium	570	770	19	7.6	---	610
	Thallium	4.6	---	---	---	---	5.8
	Total Uranium	30	30	30	30	30	30
	Vanadium	37	31	17	16	---	250
Radionuclides (pCi/L)	Radium-226	5.3	---	---	---	16	4.2
	Thorium-228	1.9	2.4	3.2	3.4	3.4	2.0
	Thorium-230	4.2	7.0	7.4	6.0	5.0	21
	Thorium-232	---	1.8	---	0.2	---	---
	Uranium-234	12	32	1.8	6.6	4.8	14
	Uranium-235	---	4.2	---	---	---	---
	Uranium-238	13	31	1.4	5.2	3.0	11

Table F-1. ROD Monitoring Guidelines for Ground Water at the Latty Avenue Properties

Analyte Type	Soil COCs	HISS-17S	HISS-18S	HISS-19S	HW21	HW22	HW23
Inorganics (µg/L)	Antimony	---	---	7.4	---	---	4.6
	Arsenic	---	6.6	510	6.8	2.4	320
	Barium	500	410	1,200	3,700	460	810
	Cadmium	---	---	---	2.8	1.6	3.4
	Chromium	12	---	3.0	7.0	9.0	8.1
	Molybdenum	16	---	10	5.6	3.4	26
	Nickel	30	39	7.0	44	7.0	12
	Selenium	250	---	---	110	17	---
	Thallium	---	---	8.0	6.2	---	5.4
	Total Uranium	30	30	30	30	30	30
	Vanadium	18	16	4.4	12	4.0	6.4
Radionuclides (pCi/L)	Radium-226	5.7	5.5	2.5	8.4	11	2.4
	Thorium-228	2.4	3.2	10	4.2	1.8	2.6
	Thorium-230	3.8	5.8	12	5.2	3.8	5.2
	Thorium-232	---	1.9	---	---	---	1.0
	Uranium-234	8.2	8.2	---	24	6.4	3.8
	Uranium-235	---	---	---	2.0	---	---
	Uranium-238	5.6	3.7	---	16	5.4	3.2

[a] The ROD evaluation criteria for HISS-06A and HISS-11A were calculated using historical data from wells previously at these locations (HISS-06 and HISS-11).

Notes:

Ground-Water Monitoring Guideline = 2 x UCL_{95}

Total U monitoring guide = 30 µg/L.

--- The analyte was not detected in the historical database, so a monitoring guideline was not developed.

Table F-2. ROD Monitoring Guidelines for Ground Water at the SLAPS and SLAPS VPs

Analyte Type	Soil COCs	B53W01D	B53W01S	B53W06S	B53W07D	B53W07S	B53W09S	B53W13S	B53W17S	B53W18S
Inorganics (µg/L)	Antimony	---	---	105	5.0	---	---	---	---	---
	Arsenic	170	---	---	150	140	---	---	---	3.6
	Barium	840	390	190	730	530	630	510	450	1,200
	Cadmium	---	---	---	---	---	---	---	8.8	---
	Chromium	7.2	15	47	5.6	11	9.6	9.1	7.0	51
	Molybdenum	---	---	22	4.0	4.4	14	3.2	21	28
	Nickel	---	30	16	12	5.2	83	38	5.2	910
	Selenium	---	---	---	4.0	5.2	700	790	140	---
	Thallium	---	8.0	---	7.4	---	---	7.0	---	---
	Total Uranium	30	30	30	30	30	30	30	30	30
	Vanadium	19	44	48	12	17	24	---	83	54
Radionuclides (pCi/L)	Radium-226	4.4	---	3.8	3.4	7.2	2.5	---	---	7.2
	Thorium-228	1.6	1.0	1.5	---	2.2	3.0	4.4	3.8	7.0
	Thorium-230	5.8	2.9	3.9	4.4	4.0	5.0	6.0	5.6	8.0
	Thorium-232	---	---	---	---	---	---	---	---	1.4
	Uranium-234	3.4	8.2	66	3.6	11	18	13	5.4	4.5
	Uranium-235	---	---	2.9	---	---	6.1	---	4.4	---
	Uranium-238	2.7	2.7	57	4.6	8.2	13	10	4.2	3.4

Table F-2. ROD Monitoring Guidelines for Ground Water at the SLAPS and SLAPS VPs

Analyte Type	Soil COCs	B53W19S	MW31-98	MW32-98	PW35	PW36	PW42	PW43	PW44	PW45	PW46[a]
Inorganics (μg/L)	Antimony	---	---	---	---	---	---	---	---	---	---
	Arsenic	36	---	5.8	90	220	280	53	13	---	7.0
	Barium	510	1,300	700	3,300	1,500	670	260	260	610	250
	Cadmium	0.7	3.8	3.8	0.6	---	0.8	---	---	---	1.2
	Chromium	290	4.6	5.6	16	3.2	52	3.5	---	---	37
	Molybdenum	130	35	3.0	32	8.0	6.0	6.4	12	1,500	2.2
	Nickel	1,100	7.8	4.0	35	13	28	3.6	---	67	3.4
	Selenium	4.2	390	740	2.8	3.8	---	---	---	7,200	710
	Thallium	7.7	---	9.8	7.4	14	7.6	---	---	---	---
	Total Uranium	30	30	30	30	30	30	30	30	30	30
	Vanadium	36	110	54	35	13	12	3.1	---	---	67
Radionuclides (pCi/L)	Radium-226	1.4	3.4	1.6	8.0	2.0	4.0	6.1	1.8	2.4	22
	Thorium-228	5.2	4.6	1.4	2.6	2.6	1.6	2.4	3.4	2.5	2.1
	Thorium-230	6.0	4.0	4.0	4.1	3.6	3.4	2.6	12	5.8	60
	Thorium-232	2.2	---	0.4	2.3	---	---	---	---	---	7.0
	Uranium-234	2.4	7.0	21	4.3	3.2	9.0	29	4.7	79	5,500
	Uranium-235	---	5.9	9.4	---	---	---	2.2	---	3.0	290
	Uranium-238	1.8	5.7	19	4.7	4.9	6.6	26	3.4	64	5,600

[a] The ROD evaluation criteria for PW46 were calculated using historical data from a well previously at this location (PW38).

Notes:

Ground-Water Monitoring Guideline = 2 x UCL_{95}

Total U monitoring guide = 30 μg/L.

[---] The analyte was not detected in the historical database, so a monitoring guideline was not developed.

APPENDIX G

DOSE ASSESSMENT ASSUMPTIONS

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A. DOSE FROM THE ST. LOUIS AIRPORT SITE/ST. LOUIS AIRPORT SITE VICINITY PROPERTIES TO A MAXIMALLY EXPOSED INDIVIDUAL

A full-time employee business receptor was evaluated to determine the maximally exposed individual from the SLAPS, because the RA work conducted on the SLAPS VPs occurred in the vicinity of the receptor. The business receptor worked full-time outside of the facility, located approximately 1,640 ft (500 m) west-southwest of the center of the SLAPS Loadout area. Exposure time was 2,000 hours per year (250 days per year).

Gamma radiation and radon exposure measured at the SLAPS perimeter assumes that a hypothetical member of the public would be at the same location 24 hours per day, 365 days per year. Off-site dose to the nearest member of the public is dependent upon the member's proximity to the gamma source and amount of time spent at the affected site. A more realistic approach to project dose is to evaluate members of the public as either residence-based or off-site-worker-based receptors. A residence-based, off-site exposure assumes a 100-percent occupancy rate at a given location. No public areas or residences exist near the SLAPS; therefore, exposure to a residence-based receptor is greatly reduced due to the distance relative to the site. An off-site-worker exposure assumes that a worker's occupancy rate is 23 percent, based on 8 hours per day, 5 days per week, and 50 weeks per year. The off-site-worker-based receptor is a more realistic choice to represent the hypothetical maximally exposed individual because of the proximity of the receptor. A realistic assessment of dose can be performed using conservative assumptions of occupancy rate and distance from the source.

The following dose assessment is for a maximally exposed individual who works full time (2,000 hours per year) at a location approximately 1,640 ft (500 m) west-southwest of the center of the SLAPS Loadout area.

1. Airborne Radioactive Particulates

The EDE of less than 0.1 mrem/yr to the receptor was calculated by using activity fraction and air particulate monitoring data to determine a source term, and then using the USEPA CAP88-PC modeling code to calculate dose to the receptor at 1,640 m (500 m) west-southwest of the center of the SLAPS Loadout area (Leidos 2014c). Details related to calculation of EDEs for the exposed receptors are presented in Appendix A.

2. External Gamma Pathway

Because station PA-1 was the closest to the receptor, the TLD results from this station were used for the dose calculations. Station PA-1 TLDs measured an annual exposure, above background, of 1 mrem/yr based on 8,760 hours of continuous exposure. The dose equivalent due to gamma exposure for the maximally exposed individual is estimated by assuming that the site approximates a line source with a source strength (H_1) that is the average of the TLD measurements between the source and the receptor (Cember 1996).

$$H_1 = 1 \text{ mrem/yr}$$

Based on a 100-percent occupancy rate, the exposure rate (H_2) to the receptor was calculated as follows:

$$H_2 = H_1 \times \frac{h_1}{h_2} * \frac{\tan^{-1}(L/h_2)}{\tan^{-1}(L/h_1)}$$

$$H_2 = 2E\text{-}04 \text{ mrem/yr}$$

where:

- H_2 = exposure rate to the receptor (continuous exposure)
- H_1 = exposure rate to TLDs
- h_2 = distance from source to receptor = 1,640 ft (500 m)
- h_1 = distance from source to TLDs = 5.2 ft (1.6 m)
- L = average distance from centerline of the line source (H_1) to the end of the line source = 164 ft (50 m)

The actual dose to the maximally exposed individual, who is only present during a normal work year, is calculated as follows:

$$H_{MEI} = H_2 \times \frac{2{,}000 \text{ hours per work year}}{8{,}760 \text{ hours per total year}} = 5E\text{-}05 \text{ mrem/yr}$$

$$H_{MEI} = <0.1 \text{ mrem/yr}$$

3. Airborne Radon Pathway

The SLAPS ATDs measured an above background annual exposure of 0 pCi/L based on 8,760 hours of continuous exposure. Exposure to the receptor from radon (and progeny) was estimated using a dispersion factor (C_2) and the average ATD monitoring data (S_1) at the site perimeter between the source and the receptor (Leidos 2013c).

$$S_1 = 0 \text{ pCi/L}$$

The actual radon exposure dose to the hypothetical maximally exposed individual was calculated as follows:

$$S_{MEI} = S_1 \times F \times DCF \times T \times C_1 \times C_2$$

$$S_{MEI} = 0 \text{ pCi/L} \times 0.0005 \frac{\text{WL}}{\text{pCi/L}} \times 1{,}250 \frac{\text{mrem}}{\text{WLM}} \times \frac{2{,}000 \text{ hours}}{\text{year}} \times \frac{1 \text{ month}}{170 \text{ hours}} \times 0.0045 = 0 \text{ mrem/yr}$$

where:

- S_{MEI} = Radon exposure to the hypothetical maximally exposed individual
- S_1 = Fenceline average of ATD measurements between source and receptor
- F = Equilibrium fraction of 0.05 WL per 100 pCi/L (DOE 1998)
- DCF = Dose Conversion Factor (USEPA 1989b) = 1,250 mrem/working level month (WLM)
- T = Exposure time = 2,000 hours/year
- C_1 = Occupancy factor constant = 1 month per 170 hours
- C_2 = Constant derived using CAP-88PC Version 2.0, the Lambert – St. Louis International Airport wind file (assuming a distance of 1,312 ft [400 m]), and an impacted surface area of 15,425 square feet (ft^2) (1,433 square meters [m^2]). Calculation assumes a 1 curie (Ci)/year radon release rate and then ratios the concentrations at 3.3 ft (1 m) and 525 ft (160 m) to determine the constant.

WL = working level (concentration unit)

WLM = working level month (exposure unit)

4. Total Effective Dose Equivalent

TEDE = CEDE (airborne particulates) + H_{MEI} (external gamma) + S_{MEI} (airborne radon)

TEDE = <0.1 mrem/yr + <0.1 mrem/yr + 0 mrem/yr = <0.1 mrem/yr

B. DOSE FROM COLDWATER CREEK TO MAXIMALLY EXPOSED INDIVIDUAL

The following dose assessment is for a maximally exposed individual who is assumed to be a youth who spends time at CWC for recreational purposes.

1. Contaminated Water Ingestion (Leidos 2014d)

The UCL_{95} values of the average contamination values measured in CWC in 2013 at each monitoring station (Table G-1) were used to calculate the EDE to the receptor from an intake of contaminated water. Assumptions are as follows:

The receptor visits CWC as a recreational user once every 2 weeks (26 visits per year), and the receptor drinks 2 L per day of contaminated water from the creek during each visit (USEPA 1989c).

The TEDE due to ingestion of surface water ($TEDE_w$) was calculated as follows:

$$TEDE_W = \Sigma\ (TEDE_{Tot\text{-}U}, TEDE_{Th\text{-}228}, TEDE_{Th\text{-}230}, TEDE_{Th\text{-}232}, TEDE_{Ra\text{-}226}, TEDE_{Ra\text{-}228})$$

$$TEDE_i = (UCL_{95})\ \text{pCi/L} \times 2.0\ \text{L per day} \times 26\ \text{days per year} \times \text{DCF mrem/pCi}$$

Table G-1. UCL_{95} Values for Radionuclides for CY 2013

Radionuclides	UCL_{95} Concentration	Unit
Ra-226	1.94	pCi/L
Th-228	0.55	pCi/L
Th-230	0.76	pCi/L
Th-232	0.40	pCi/L
Total U	2.77	pCi/L

DCFs (USEPA 1989b) for radionuclides present in CWC surface water are presented in Table G-2.

Table G-2. Radionuclide Dose Conversion Factor for CY 2013

Radionuclides	DCF	Unit
Ra-226	1.33E-03	mrem/pCi
Th-228	3.96E-04	mrem/pCi
Th-230	5.48E-04	mrem/pCi
Th-232	2.73E-03	mrem/pCi
Total U	2.50E-05	mrem/pCi

The USEPA's software ProUCL Version 3.0 was used to determine the UCL_{95} values for radiological contaminants present in CWC (Leidos 2014d). The UCL_{95} values are presented in Table G-1.

Therefore:

$$TEDE_{Ra\text{-}226} = 1.94 \text{ pCi/L} \times 2.0 \text{ L/d} \times 26 \text{ d/yr} \times 1.33\text{E-03 mrem/pCi} = 1.34\text{E-01 mrem/yr}$$

$$TEDE_{Th\text{-}228} = 0.55 \text{ pCi/L} \times 2.0 \text{ L/d} \times 26 \text{ d/yr} \times 3.96\text{E-04 mrem/pCi} = 1.14\text{E-02 mrem/yr}$$

$$TEDE_{Th\text{-}230} = 0.76 \text{ pCi/L} \times 2.0 \text{ L/d} \times 26 \text{ d/yr} \times 5.48\text{E-04mrem/pCi} = 2.16\text{E-02 mrem/yr}$$

$$TEDE_{Th\text{-}232} = 0.40 \text{ pCi/L} \times 2.0 \text{ L/d} \times 26 \text{ d/yr} \times 2.73\text{E-3 mrem/pCi} = 5.66\text{E-02 mrem/yr}$$

$$TEDE_{Tot\text{-}U} = 2.77 \text{ pCi/L} \times 2.0 \text{ L/d} \times 26 \text{ d/yr} \times 2.50\text{E-05 mrem/pCi} = 3.60\text{E-03 mrem/yr}$$

$$TEDE_{W} = 2.27\text{E-01 mrem/yr}$$

2. Contaminated Sediment Ingestion (Leidos 2014d)

The UCL_{95} values of the average contamination values measured in CWC in 2013 at each monitoring station (Table G-3) were used to calculate the EDE to the receptor from an intake of contaminated sediment. Assumptions are as follows:

The receptor visits CWC as a recreational user once every 2 weeks (26 visits per year). The receptor ingests 50 mg/day of contaminated sediment from the creek during each visit (USEPA 1989c).

The TEDE due to ingestion of contaminated sediment ($TEDE_S$) was calculated as follows:

$$TEDE_S = \Sigma\,(TEDE_{Tot\text{-}U}, TEDE_{Th\text{-}228}, TEDE_{Th\text{-}230}, TEDE_{Th\text{-}232}, TEDE_{Ra\text{-}226}, TEDE_{Ra\text{-}228})$$

$$TEDE_i = (UCL_{95}) \text{ picocuries per gram (pCi/g)} \times 0.05 \text{ gram (g)/day} \times 26 \text{ days per year} \times \text{DCF mrem/pCi}$$

Table G-3. UCL_{95} Values for Radionuclide for CY 2013

Radionuclides	UCL_{95} Concentration	Unit
Ra-226	1.26	pCi/g
Ra-228	0.79	pCi/g
Th-228	1.02	pCi/g
Th-230	3.31	pCi/g
Th-232	0.97	pCi/g
Total U	2.01	pCi/g

DCFs (USEPA 1989b) for radionuclides present in CWC sediment are presented in Table G-4.

Table G-4. Radionuclide Dose Conversion Factors for CY 2013

Radionuclides	DCF	Unit
Ra-226	1.33E-3	mrem/pCi
Ra-228	1.44E-3	mrem/pCi
Th-228	3.96E-4	mrem/pCi
Th-230	5.48E-4	mrem/pCi
Th-232	2.73E-3	mrem/pCi
Total U	2.50E-5	mrem/pCi

The USEPA's software ProUCL Version 3.0 was used to determine UCL_{95} values for radiological contaminants present in CWC sediment (Leidos 2014b). The UCL_{95} values are presented in Table G-3.

Therefore:

$$TEDE_{Ra\text{-}226} = 1.26 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 1.33E\text{-}3 \text{ mrem/pCi} = 2.17E\text{-}03 \text{ mrem/yr}$$

$$TEDE_{Ra\text{-}228} = 0.79 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 1.44E\text{-}3 \text{ mrem/pCi} = 1.47E\text{-}03 \text{ mrem/yr}$$

$$TEDE_{Th\text{-}228} = 1.02 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 3.96E\text{-}4 \text{ mrem/pCi} = 5.26E\text{-}04 \text{ mrem/yr}$$

$$TEDE_{Th\text{-}230} = 3.31 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 5.48E\text{-}4 \text{ mrem/pCi} = 2.36E\text{-}03 \text{ mrem/yr}$$

$$TEDE_{Th\text{-}232} = 0.97 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 2.73E\text{-}3 \text{ mrem/pCi} = 3.44E\text{-}03 \text{ mrem/yr}$$

$$TEDE_{Tot\text{-}U} = 2.01 \text{ pCi/g} \times 0.05 \text{ g/d} \times 26 \text{ d/yr} \times 2.50E\text{-}5 \text{ mrem/pCi} = 6.54E\text{-}05 \text{ mrem/yr}$$

$$TEDE_S = 1.00E\text{-}02 \text{ mrem/yr}$$

3. Total Effective Dose Equivalent

$$TEDE = TEDE_W + TEDE_S$$

$$TEDE = 2.27E\text{-}01 \text{ mrem/yr} + 1.00E\text{-}02 \text{ mrem/yr} = 0.2 \text{ mrem/yr}$$

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