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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
8945 LATTY AVENUE
BERKELEY, MISSOURI 63134

July 30, 2012

REPLY TO
ATTENTION OF

Formerly Utilized Sites Remedial Action Program (FUSRAP)

SUBJECT: Draft Final Remedial Investigation and Baseline Risk Assessment Report for the Inaccessible Soil Operable Unit at the St. Louis Downtown Site (SLDS), dated July 26, 2012

Mr. Branden Doster
Missouri Department of Natural Resources
1730 E. Elm St.
Jefferson City, MO 65101

Dear Mr. Doster:

Enclosed are 2 hard copies and 1 electronic copy of the subject document along with final responses to comments on the previous revision. Per the terms of the Federal Facilities Agreement, Section X.B.1, the subject document will become final on August 30, 2012 if dispute resolution is not invoked or as modified by decision of the dispute process.

Copies of this document are also being provided to Ms. Tiffany Burgess (Missouri Dept. of Natural Resources), Mr. Matthew Jefferson (Environmental Protection Agency), Ms. Karen Burke (Mallinckrodt), and Ms. Robin Rodriguez.

If you have any questions or require additional information, please contact Mr. Brenton Barkley at 314-260-3922 or Brenton.C.Barkley@usace.army.mil.

Sincerely,

Sharon Cotner

Sharon R. Cotner
FUSRAP Program Manager

Final Responses, Submitted July 30, 2012 to DHSS Comments on the SLDS Remedial Investigation and Baseline Risk Assessment, Revision B, dated November 10, 2011

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1		Section 2.1.1, *Inaccessible Soil Investigation,* does not clearly outline where non-radionuclide contamination was or is to be sampled. ISOU RIWP Section 3.1.2, *PCOCs,* provides a list of criteria when metals would be sampled. Specifically, areas should be included "if they were commingled with MED/AEC (Manhattan Engineering District/ Atomic Energy Commission) radionuclide concentrations greater than risk-based screening levels (SLs) identified for SLDS." Language used throughout the RI, particularly in site-specific nature and extent descriptions (i.e. Section 4.2.1.2, *Nature and Extent of Contamination at Plant 1*) excludes analysis for metals in areas not considered a "uranium processing area". Nowhere in the ISOU RIWP is it stated that the area be considered a uranium processing area before metals analysis of soils is required. Revise Section 2.1.1 to include ISOU RIWP requiring evaluation of non-radionuclide contamination when commingled with MED/AEC radiological concentrations above SLs.		Section 3.1.2 of the RI WP states "*The list of PCOCs for the ISOU is derived from the radiological and non-radiological contaminants identified as attributed to MED/AEC contamination as shown in Table 3-1. Because the uranium-ore processing operations were conducted in different areas of the plant site from other radiological processing activities, the source of potential contamination from non-radiological PCOCs (arsenic and cadmium) can be roughly delineated. The specific properties within the former MED/AEC uranium-ore processing areas of the SLDS were designated in Figure 5-7 of the 1998 SLDS ROD and are also shown in Figure 2-1 of this document. Those properties located within the uranium-ore processing boundary are Plant 2; Plant 6; Plant 7; DT-10 Thomas and Proetz Lumber; portions of Terminal RR (DT-9) between Plants 2 and 6; portions of BSNF RR (DT-12) adjacent to Plants 6 and 7; portions of Destrehan Street adjacent to Plants 2, 6, and Plant 7; Hall Street between Plants 2 and 6; and portions of Mallinckrodt Street adjacent to Plant 2.* *Therefore, for characterization activities at properties within the uranium-ore processing boundary, the non-radiological PCOCs (arsenic and cadmium) will be investigated in addition to radiological PCOCs. Because sediment present in the drains, manholes, and storm sewers used for MED/AEC operations has never been analyzed for metals during past investigations, metals associated with formerly used pitchblende and domestic ores have been identified as PCOCs for sampling and analysis of sediment (Table 3-1)".* In addition, Table 3-1 of the RI WP has the following footnote in regards to arsenic, cadmium, and uranium

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				"a Applicable to soil in ore processing areas: Plants 2, 6, and 7, DT-10, and portions of DT-9, DT-12, Hall Street, Mallinckrodt Street, and Destrehan Street (USACE 2004c)." Sampling for metals was consistent with the approach set forth in the RI WP and described in Section 2.1 of the RI Report.
2		Section 2.2.2, *Buildings and Structures Investigations,* notes "For the purpose of the surveys conducted during this RI, any structure exhibiting fixed-point measurement(s) that exceeded the gross alpha SL of 3,900 dpm/100 cm^2 (disintegrations per minute per one hundred centimeters-squared) was subjected to additional evaluation to determine the extent of contamination." Note that to develop surface activity gross DCGLs that include a decay series, the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) approach includes use of fraction of alpha to total decays and the radionuclide-based derived concentration guideline levels (DCGLs) (see MARSSIM Section 4.3.2, *DCGLs and the Use of Surrogate Measurements*). Please compare the method for developing gross alpha and beta DCGLs (as described in Section B-2.5, *Calculating Gross Alpha and Gross Beta Derived Concentration Guideline Levels,* of the document *Remedial Investigation Work Plan for the Inaccessible Soil Operable Unit at the St.*		Revised gross alpha DCGLs have been derived for interior and exterior surfaces in the latest version of the RI/BRA DCGLs. The derivations are presented and discussed in the newly added Appendix S. Both DCGLs are listed in the revised Table 4-1 and are protective of industrial and maintenance worker exposures to interior and exterior surfaces, respectively. Also, based on comments received from other reviewers, the term "DCGL" in the document has been changed to "preliminary remediation goal" or PRG. MARSSIM Section 4.3.2 addresses the use of a surrogate to establish the DCGL/screening level. The DCGL/screening level listed in the ISOU RI was established to include all radionuclides of concern, so the use of a surrogate is not applicable. The PCOCs and associated progeny are accounted for in the derivation of the alpha screening level. RESRAD-Build accounts for progeny as applicable.

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		Louis Downtown Site, May 14,2009), with the MARSSIM approach. Specifically, the comparison should identify the method used to evaluate the ratios of alpha to total decays, to include the decay chain for each radionuclide. See MARSSIM Section 4.3.2 for further information and example calculations that address secular equilibrium within surrogate measurements.		
3		For Table 4.1, *Screening Levels and Background Values/or Potential Contaminants of Concern Identified/or the Inaccessible Soils Operable Unit,* only Environmental Protection Agency (EPA) regional screening levels (RSLs) for non-radiological parameters are for an industrial exposure scenario. Within the ISOU RIWP Figure A-I, *Conceptual Site Model for Inaccessible Soil at the SLDS,* a future resident is identified. See Section 3.10.1, *ISOU CSM,* of the ISOU RIWP. According to the conceptual site model (CSM), residential is to be evaluated with the caveat that the evaluation is for informational purposes only. A quantitative evaluation of risk for this receptor is needed to determine long-term stewardship (LTS) for SLDS sites. Screening levels (SLs) for residential should be provided for the LTS as well as the "as low as reasonably achievable" (ALARA) evaluations.		The CSM is subject to refinement with the progression of decision documents along the CERCLA process. The CSM has undergone a number of refinements which include identification of current and future receptors and exposure pathways. Residential evaluations were not conducted in the ISOU BRA because the SLDS properties are currently zoned industrial in a manner that does not allow new residential land use. The long-term plans by the city of St. Louis for the SLDS area are to retain the industrial uses, encourage the wholesale produce district, and phase out the remaining residential land uses located west of the SLDS. According to the City of St. Louis Zoning District Map at http://stlcin.missouri.org/zoning/map.cfm, the SLDS properties are actually currently zoned as either "J Industrial District" or "K Unrestricted District". Regardless of which of these two zoning classifications the SLDS properties fall under, it appears that based on the current configuration of SLDS properties buildings, no buildings may be erected or altered for residential dwelling purposes. From the St. Louis City Revised Code at http://www.slpl.lib.mo.us/cco/code/title26.htm: St. Louis City Revised Code Chapter 26.56, J INDUSTRIAL DISTRICT, (Ord. 59979 § 15 (part), 1986.), 26.56.020 Use regulations. "The use regulations are the same as those in the I central business district, except that...and provided

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				further that no building shall be in any case hereinafter erected nor shall any existing building be converted, reconstructed or structurally altered for dwelling purposes except where forty percent (40%) or more of the frontage is occupied by dwellings." St. Louis City Revised Code Chapter 26.60, K UNRESTRICTED DISTRICT, (Ord. 59979 § 16 (part), 1986.), 26.60.020 Use regulations. "In the unrestricted district buildings and premises may be used for any purpose whatsoever not in conflict with any ordinance of the city regulating nuisances or Section 26.60.025...Provided, however, that no building shall be hereafter erected, nor shall any existing building be converted, reconstructed or structurally altered for dwelling purposes." According to the City of St. Louis Strategic Land Use Plan at http://stlouis-mo.gov/government/departments/planning/planning/adopted-plans/strategic-land-use/, which was adopted by the City of St. Louis' Planning Commission on January 5th, 2005, all SLDS properties are listed as "Business and Industrial Preservation and Development Area" or "Business and Industrial Development Area". A summary of these zoning excerpts was inserted in place of and/or in addition to the Revision B text in the last paragraph of Section 3.1. Remedial actions at accessible soil areas of the properties being investigated as part of the ISOU are being conducted under the 1998 ROD, which authorizes remediation to eliminate or minimize only those risks above limits acceptable for industrial land use. A quantitative evaluation of risk to determine long-term stewardship (LTS) for SLDS sites (including ALARA analysis) is not within the scope of this

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				document. Those evaluations will be included in post remedial action summary reports, as applicable. The CSM now presented in Figures 6-3 and K-3 have been modified to include the residential receptor, but all exposure pathways are either incomplete or insignificant based on the above information.
4		For Table 4-1, a footnote is needed that acknowledges the need to ensure that the concentration of thorium-230 (Th-230) will not lend to radium-226 (Ra-226) exceeding its Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) based SLs. This issue was discussed during the most recent 5-year review for SLDS.		Table 4-1 has been revised to reflect the change in screening levels to USEPA's risk-based generic preliminary remediation goals (PRGs) for outdoor worker exposures to soil (dated August 2010), targeting a cancer risk of 1E-06 for radiological PCOCs and USEPA's industrial regional screening levels (dated April 2012) that target either a cancer risk of 1E-06 or a hazard index of 1.0 for metals PCOCs. Also, the industrial worker PRGs for soil were used to evaluate sewer sediment data because no published sediment PRGs are available for human health. As a result of these changes, Section 4.1 has been rewritten, and Table 4-1 has been revised accordingly. The UMTRCA levels have been removed from the revised RI/BRA Report and will be evaluated in the FS as ARARs.
5		For Table 4-1, radionuclides not identified include lead-210 (Pb-210), actinium-227 (Ac-227), proactinium-231 (Pa-231), thorium-228 (Th-228), uranium-234 (U-234), and uranium-235 (U235). Footnote "c" indicates that U-238 serves as a surrogate for these radionuclides. DHSS is unaware of any verification of surrogate ratios or modeling (i.e. RESRAD) to verify that the UMTRCA cleanup goal is protective for U-238 and all listed radionuclides. Except for U-234 and Pb-210, none of the radionuclides are decay		See response to comment 4 above.

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		products of U-238, which would allow for some type of decay ratio that could be assumed. Given this information was not provided in the ISOU RIWP, please provide in the RI additional discussion on how the U-238 cleanup goal is protective, and verify using RESRAD for soils and RESRAD Build for inhabitable structures.		
6		For Table 4.1, before the UMTRCA SLs are used, they should be verified to be protective using the current conceptual site model (CSM), to include a residential scenario. Also, according to EPA Directive 9200.4-25, *Soil Cleanup Criteria in 40 CFR Part* 192, 15 picocuries per gram (pCi/g) in subsoil is not health protective (this value represents total acceptable risk), but a suitable detection limit for sites with potentially significant contamination levels. Therefore, whenever the 5 pCi/g and/or 15 pCi/g radium standards are used as relevant and appropriate requirements, the standards must apply to the combined activities of Ra-226 and radium-228 (Ra-228), and combined activity of their parent radionuclide thorium-230 (Th-230) and thorium-232 (Th-232). Please discuss these issues in the RI.		See response to comments 3 and 4 above.
7		According to Section 4.1.1, *Radiological Screening Levels,* the gross alpha DCGL is based on radionuclide-specific DCGLs using average soil concentrations from the 1993 baseline risk assessment based on methods prescribed in *Derivation of Site-Specific DCGLs for North County Structures, 2004.* These values may be outdated, and should be verified in this RI.		The interior and exterior gross alpha DCGLs listed in the revised ISOU RI/BRA Report are more restrictive using the activity fractions from the 1993 BRA than if they were derived using current soil data exposure point concentrations from the RI/BRA. The gross alpha DCGLs listed in the RI/BRA are protective of industrial and maintenance worker exposures to interior and exterior surfaces, respectively.
8		For Section 4.1.1, the formula for the sum of ratio (SOR) implies that the sum of ratios only evaluates the greater of a principle radionuclide or associated radionuclide. This is of particular concern given each		See response to comment 4 above.

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		radionuclide presents different risk (variables include age-and gender- dependence of radionuclide intake, metabolism, dosimetry, and radiogenic risk) for each pathway. Also, as noted in comment 6 above, radium (Ra-228 and Ra-226) and thorium (Th-232 and Th-230) activities should be combined before comparing to the UMTRCA SL. This discussion was not provided in the ISOU RI WP, and for transparency should be explained in detail in the RI.		
9		For Table K-10, *Input Values for Non-default Residual Radioactivity-Build Model Parameters,* the RESRAD development of gross DCGLs outlined in the ISOU RIWP should be revised as follows: a. The Exposure Duration (ED) variable which is set to 365 days in the RESRAD-Build modeling in this document should be revised to represent 25 years of exposure for a worker or 30 years for a resident receptor. The formula used to estimate dose (i.e. total dose equivalent) are the same used for risk, each requiring ED in days. Calculation of ED equals exposure days per year (i.e. 250 for worker, and 350 for resident) multiplied by years of exposure (i.e. 30 years). The only exception is for the construction worker, who is estimated to work 90 days in a one year period.		a. The DCGL/Screening level for interior surfaces was revised and a new DCGL/Screening level for exterior surfaces was developed. Both DCGL/Screening levels are based on an exposure duration (ED) of 25 years (9125 days) for the industrial worker. RESRAD-Build considers ED as the total length of time considered by the dose assessment, including intervals during which receptors may be absent from the building. The indoor fraction (IF) is the fraction of the exposure duration spent by one or more receptors inside a building. The IF is used in the exposure calculations to calculate the amount of time spent at each receptor location. Actual exposure times at each location are estimated by multiplying the ED by the IF. IFs for exterior and interior surfaces are 10 days/year (80 hours/year = Indoor Fraction: 0.0091) and 250 days/year (2000 hours/year = Indoor Fraction: 0.23), respectively. Both DCGLs (now referred to as PRGs) are protective of the industrial and maintenance workers at the target cancer risk of 1E-06.

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		b. The only evaluation times appear to be 0 and 1 year. Dose and risk is to be assessed over 1,000-year duration. For comparison purposes, Appendix B Section B-2.2.I, *Defining the Source Term,* identifies years 0, 1, 3, 10, 30, 100, 300, and 1,000 as needing to be assessed. If an analysis has been performed and only the most conservative evaluation times are provided, please note this in text.		b. The evaluation times have been changed to 0, 1, 3, 10, 30, 100, 300, and 1,000 years. Only the maximum total doses and risks from throughout the 1,000-year evaluation period are reported for each of the two receptor scenarios, which occur in the first year.
10		For Table 4.1, the non-carcinogenic SL for uranium is presented in mass per unit mass. Most of the analytical work for SLDS is provided in activity per unit mass. For ease of evaluating risk, DHSS recommends that the SL be provided in both units for non-carcinogenic risk. When converting the number of atoms to mass either provide screening values for each uranium isotope or discuss the effects of different atomic weights and half lives if one isotope is used. Units of activity should be expressed in picocuries (pCi).		Activity concentrations are applicable to carcinogenic risk. Expressing the SL (now referred to as PRG) as activity per unit mass is not applicable to noncarcinogenic risk.
11		For Figure 5.1, *Conceptual Site Model for St. Louis Downtown Sites, Inaccessible Soil Operable Unit,* the CSM differs from the CSM in the ISOU RI WP and should be revised as follows: a. The source "soil" differs from the CSM provided in the ISOU RIWP. The source, previously defined as "inaccessible soils", is now qualified as "Beneath Consolidated Ground Cover" or "Beneath Unconsolidated Cover or No Cover". Ultimately, this partition of source results in different pathways being assessed. Please provide details on the impact, if any, of this modification.		a. The source term for the inaccessible soil portion of the CSM (Figures 6-3 and K-3) has been refined to better reflect the four main categories of inaccessible soil being evaluated in the RI/BRA. Because of the presence of consolidated ground cover versus no cover, or the presence of soil on exterior building surfaces, the transport pathways from each source type are different. The transport pathways associated with each ISOU sources are discussed in Sections 5.2.1.1 through 5.2.1.4. b. The CSM has been revised to include receptors

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		b. No receptors are identified. Update to include receptors and pathways of exposure for each. Refer to Figure A-1, *Conceptual Site Model for Inaccessible Soil at the SLDS,* for receptors and pathway analysis.		and exposure routes, and is now presented in Figures 6-3 and K-3. Additionally, the Section 5 text now clarifies the difference between evaluation of current configurations versus loss of health-protective barriers (i.e., ground cover) under current and future scenarios, respectively.
		c. The sources are not the same. The ISOU RIWP identifies "Structure Surfaces", whereas this figure identifies "Soil on Structural Surfaces". Regardless of the source terminology, do not identify contamination on buildings simply as dust, but include fixed contamination incorporated into building surfaces. Examples of incorporated soils include bituminous coatings (i.e. roofing tar) and painted surfaces.		c. The radiological contamination being evaluated for surfaces in the ISOU is from soil. It is assumed that the surface contamination is only 20% removable.
		d. A release/transport mechanism is not provided for gasses and volatilization to indoor air pathway. Soil and groundwater will be potential sources. Radon is the potential contaminant of concern (PCOC) for this pathway. See the ISOU RIWP Section A-4.2.2, *Inaccessible Soil Operable Unit Contaminant Release and Transport Mechanisms,* paragraph 3, which recognizes that the pathway may be complete given Ra-226 concentrations exceed its SL. As noted in comment 19 below, revise the CSM to include volatilization to indoor air pathway.		d. See response to comment 19 below. Based upon the response to comment 19, this pathway has been added to the CSM as being potentially complete for indoor air, but not evaluated due to insufficient data. The completeness of this pathway is currently being evaluated through site monitoring.
		e. For the current SLDS Plant Employee receptor, there are site-specific exposures to inaccessible soils that need to be evaluated. For example, Section 4.2.8.2, *Nature and Extent of Contamination at DT-6,* notes that the storage building has an earthen floor. This would be inaccessible soil that has more than external exposure to radionuclide. Other exceptions may		e. The RI/BRA has been revised to address evaluations to only the sitewide and property-specific levels of evaluation. Area-specific evaluations addressing specific elevated measurement areas and soil beneath specific buildings are being addressed in the FS.

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		exist, which must be evaluated on a site-by-site basis. Revise to make this pathway potentially complete, with notation that site-specific exceptions to the CSM exist. f. For the source "Inaccessible Soil Adjacent to Sewer Lines", no direct-contact pathway to soil as an exposure media is identified. Revise to include the exposure pathways ingestion, inhalation, and external exposure.		f. These pathways were quantitatively evaluated for the sewer utility worker in the HHRA and have been added for this scenario in the revised CSM.
12		For the risk-based individual radionuclide DCGLs used in this document, and provided in Table B-4, *Individual Radionuclide DCGLs Equivalent to 25 mrem/year and 10-6 Risk,* DHSS' calculations indicate that the risk level for the DCGLs is equivalent to 1.0E-04, not 1.0E-06. This corresponds to a two-order-of-magnitude lesser DCGL based upon risk than currently proposed. Section 6.1, *Human Health Risk Assessment,* notes a carcinogenic risk threshold of 1.0E-05. Due to the presence of 11 radionuclides being assessed, and considering additivity of risk, the DCGLs should be reduced by a factor of 10. Therefore, to meet the proposed risk threshold and allow for additivity of risk, the DCGLs risk threshold should be set to 1.0E-06.		The revised gross alpha DCGLs for interior and exterior surfaces (per the response to comment 9 above) are both based upon a target cancer risk of 1E-06 and include risk from all radionuclide COCs and their associated progeny.
13		For Section 4.1.2, *Metal Screening Levels,* the statement "where background values may be used as a criterion, in conjunction with other criteria, for identifying risk driver metals as COCs" is confusing, and does not adequately describe how background will be addressed. Rephrase to identify what are the "criteria", including reference to guidance on assessing background in risk assessment.		Section 4.1 has been revised to discuss the revised data screening methodology. All discussion of background has been moved to and consolidated in Section 4.1.1.Section 4.1.2 discusses radiological PRGs and Section 4.1.3 discusses metal PRGs. A separate subsection (Section 4.2.1) now discusses qualitative comparisons with background values. Individual sample result comparisons with background values, as well as PRGs, are presented in Appendix E for inaccessible soil and Appendix J for sewer sediment and soil. In the revised RI/BRA,

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				background is not being used to for screening purposes, but rather, only for characterization purposes.
14		Within Table 4-6, *Sewer Soil Data: Stations with Radiological Potential Contaminant of Concern Concentrations Exceeding Remedial Investigation Screening Levels,* Ra-226 levels exceed the RI SLs at locations including Plant 6, Plant 7, and DT-12. None of these entries has been highlighted to indicate exceedance of SLs. Revise the table accordingly. Also, review the table for other exceedances that are not highlighted.		Section 4.0 has been rewritten and streamlined due to the changes in screening levels (now risk-based PRGs). Because of the numerous exceedances at all locations due to the conservative nature of the PRGs, the PRG comparisons with soil adjacent are now summarized as the number of exceedances in Table 4-13 of the revised RI/BRA. Individual sample result comparisons with background values and PRGs are presented in Appendix E for inaccessible soil and Appendix J for sewer sediment and soil.
15		According to Section 5.2, *Inaccessible Soil Operable Unit Contaminant Release and Transport Mechanisms,* "direct contact exposures with inaccessible soil beneath buildings, as well as with soil adjacent to sewer lines, would not occur under existing conditions and therefore this scenario is not considered in the ISOU CSM." This appears to exclude future exposure scenarios from the RI. Note in this paragraph that both current and future exposure scenarios will be evaluated, with reference to the section(s) that addresses future exposures, to provide transparency that both scenarios will be evaluated in this report.		For clarity, the CSM was revised to present/describe exposure pathways under current configurations (i.e., inaccessible soil that is not accessible due to the presence of consolidated or unconsolidated ground cover, buildings, etc.), as well as under future scenarios that assume inaccessible soils having become accessible due to loss of cover. This revision is consistent with how the HHRA has been revised to include current and future scenarios.
16		For Section 5.2, *Inaccessible Soil Operable Unit Contaminant Release and Transport Mechanisms,* decisions as to whether pathways are complete or incomplete must be based on evidence. The RI provides generic criteria in this section to categorize pathways as complete, and significant or insignificant. Credible metrics that support these criteria (i.e. soil-water partitioning coefficients) are provided in the RI (i.e. Section 5.3.4, *Partitioning and Sorption.)*		Although site-specific data for the chemical/physical properties governing environmental fate and transport of the contaminants is limited, some reasonable assumptions can be made based on the available data. K_d values vary over the site, in part due to the heterogeneous geology. A table of predicted ranges of K_d values for the ISOU COPCs has been added as Table 5-3 to Section 5.3.4. The table was developed using various site specific parameters (such as

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		However, this section only uses unsubstantiated judgment in order to derive a decision. Examples of comments that are judgmental and not founded by metrics include the following: According to Section 5.2.2.2 *Water Transport Pathways Sediment in Sewers and for Soil Adjacent to Sewers,* "Soil to ground-water transport pathway is considered potentially complete but insignificant for soil adjacent to sewer lines. This is because minimal concentrations reaching into ground water are **expected** to undergo immediate mixing in the aquifer, followed by dilution and attenuation during transport." This comment does not reference appropriate and site-specific evaluations based upon defensible metrics, including modeling or site-specific data. In addition to the metrics, source area and volume, aquifer characteristic, and preferential pathways are additional considerations to address PCOC movement, none of which are discussed. One approach may be to revise the generic criteria in Section 5.3.4 to identify specific metrics and considerations necessary to derive a site-specific decision. If metrics lead to an inconclusive decision, further investigation should be considered, or the pathway remains complete and potentially significant. Either way, additional investigation would then be required. Otherwise, propose an approach that provides similar results. Providing a decision tree may help clarify the process.		groundwater pH and the predominant grain size distribution for HU-A) and the lookup tables provided in EPA's guidance document "Understanding Variation in Partition Coefficient, K_d, Values." Text has also been added to Section 3.3 to provide the site-specific parameters used to predict the K_d values. The site-specific Kd value of 146 ml/g for uranium (based Days per year is assumed to be the amount of time out me out of the 250 days per year that a constru The 3rd paragraph of Section 5.2.2.1 (now the first paragraph in Section 5.2.2.3 in the revised RI/BRA) has been revised as follows to help support the conclusions in made later in section 5.2.2.3 of the revised RI/BRA: *"The inaccessible soil areas at the SLDS are situated within the upper hydrostratigraphic unit, HU-A. Evaluation of soil boring logs and geotechnical data indicates this unit consists primarily of fill overlying fine-grained deposits (silty clay, clay, silt, and sandy silt). The thickness of this unit typically ranges from 10 to 30 ft. An estimated hydraulic conductivity of 9.9 E-06 cm/sec (10 ft/yr) was determined, based on one variable-head permeability test within HU-A (BNI 1990). The effective cation exchange capacity (CEC) for the HU-A was determined to be 200 meq/100 g of soil. This high CEC value indicates HU-A has a high capacity to hold cations and therefore, will retard the migration of metals. The relatively small sources of contamination in inaccessible soil, the presence of clay-rich deposits, the high CEC value and the low hydraulic conductivity value for HU-A support the conclusion that migration of metals and radionuclides via ground water to the underlying Mississippi Aquifer (HU-B) at the SLDS is limited. During ground-water transport in HU-B, additional advection, sorption, and dispersion processes would*

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				further reduce concentrations prior to reaching the Mississippi River." The first part of the 3rd paragraph of Section 5.2.2.2 of the revised RI/BRA has been revised as follows: *"The soil to ground-water transport pathway is considered potentially complete but insignificant for soil adjacent to sewer lines. The sewer lines are situated within the fine-grained deposits of HU-A. As noted in Section 5.2.2.3, migration of metals and radionuclides via ground water to the underlying Mississippi Aquifer (HU-B) at the SLDS is limited due to the low permeability and high adsorption properties of the clay layers within the overlying HU-A. Once in ground water, no human exposures are expected because ground water is not being used as a potable source..."*
17		Section 5.2.1.1, *Air Transport Pathways for Inaccessible Soil Beneath Unconsolidated Cover or No Cover,* notes that the particulate emission of contaminants from inaccessible soil to the air is not a significant pathway due to the mitigating presence of structural barriers (e.g., buildings, walkways, roads, etc.) over most of the ISOU. This section is referring to soils that are beneath unconsolidated or no cover, not buildings, walkways, and roads. Revise to reference only soils meeting those conditions.		The first paragraph of Section 5.2.1.1 now reads: *"Under current conditions, the particulate emission of contaminants from inaccessible soil to the air is not a significant pathway due to the mitigating presence of ground cover (e.g., buildings, walkways, roads) over most of the ISOU. However, contaminants adsorbed to inaccessible soil in areas not under ground cover (e.g., some soil areas within 5 ft of buildings/structures and soil areas within 10 ft of RRs) may be released to the air as a result of wind agitation, and then be transported by the wind as fugitive airborne dust. Soil erosion by wind is more likely to occur in areas without a consolidated ground cover, with sparse vegetation. Because the sum of all inaccessible soil areas without consolidated ground cover is small relative to the total combined area of the SLDS and VPs, wind erosion of contaminated*

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				dusts from the uncovered areas of inaccessible soil are likely to be insignificant. Under current conditions, this pathway is rendered even more insignificant by the presence of tall buildings in close proximity to each other in the SLDS plant properties and VPs that can interfere with the air transport of wind-blown dusts. Although considered to be insignificant, this transport pathway could result in contaminant exposures via the inhalation of fugitive dusts at downwind locations. In the future, it is assumed that the removal of the structural barriers acting as ground cover could occur, thereby rendering the potential for particulate emissions and subsequent inhalation exposures as being much more significant."
18		Section 5.2.1.1 only discusses current, not future, exposure scenarios. Revise to discuss future exposures where buildings or other structures may be absent.		Please see the response to comment 15 above.
19		Section 5.2.1 notes that that due to relatively low levels of site related Ra-226 concentrations measured in the soil, site-related Rn-222 is not considered to be significant, and therefore, was not investigated during the RI. Several of the sites (i.e. Plants land 6, and DT-4) presented in Table 4-2 have sufficient quantities of Ra-226 to present a potential risk for radon. Revise the RI to address radon on a site-specific basis.		A new section has been added as Section 5.2.1.2 that discusses the potential for Ra-226 and Rn-222 build-up in indoor/outdoor air. The following has been included as part of the second paragraph of the new section: *"Site-related Rn-222 is only considered significant as a potential exposure pathway when average Ra-226 concentration levels exceed background levels beneath occupied or habitable buildings by greater than 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil, per 40 CFR 192.12(a). Additionally, because Th-230 decays to Ra-226 (which also occurs as part of the U-238 decay chain), site related Rn-222 is only considered significant when average Th-230 concentrations above background exceed 14 pCi/g in surface soil*

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				and/or 43 pCi/g in subsurface soil, which would result in a buildup of Ra-226 to levels exceeding 40 CFR 192.12(a) levels over a 1000 year period (i.e., 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil). Also, Th-230, the parent of Ra-226, has a half-life of approximately 80,000 years and is at concentrations such that the buildup of Ra-226, during the next 1,000 years, would be less than 14 pCi/g." Several ISOU areas have average Ra-226 and/or Th-230 concentration levels exceeding the values listed above. However, the Rn-222 pathway is currently considered potentially significant only for Plant 1 Building 26 and DT-4 South Storage Building. The other areas are either not below occupied or habitable buildings or it will take hundreds of years for the Ra-226 to build up from the decay of Th-230 to achieve significant levels. The substantial variations in correlations between Ra-226 in soil and Rn-222 preclude accurate modeling of indoor radon in industrial structures especially if such structures do not have basements. Actual indoor air concentrations of radon anticipated in structures is currently indeterminate. The need to measure radon concentrations in any occupied structure where there is the potential for Rn-222 in indoor air must be evaluated and the associated risk assessed individually based on such measurements. Rn-222 monitoring is currently being conducted in Plant 1 Building 26 and DT-4 South Storage Building; however monitoring results are not yet available to determine associated risk. Potential risk due to Rn-222 exposures will be determined when Rn-222 monitoring results become available.
20		For Section 6.1.2.1, *Inaccessible Soil Associated with Buildings, Structures, Railroads, and Roadways,* the		The use of industrial worker PRGs to determine COPCs is conservative because the exposure time,

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		industrial SLs are used to determine COPC for the recreational receptor. To ensure protectiveness for this receptor, a quantitative comparison of intake and external exposure (for radionuclide) for the two receptors is recommended.		frequency and duration of the industrial worker (8 hours/day for 250 days/year for 25 years, respectively) are greater than those assumed for the recreational user (ages 10 – 18 years) in the HHRA (1 hour/day for 75 days/year for 9 years. Please note that all screening levels that were previously used in the RI/BRA have been replaced with risk-based PRGs. Please see the response to comment 4 above.
21		For Section 6.1.2.1, the receptors differ from those described in Appendix B Section B-2.2.2, *Identification of Potential Receptors,* of the ISOU RIWP. Section 6.1.2.1 identifies an industrial worker, a construction worker and a recreational receptor: The RIWP identifies an industrial worker, a renovation worker, and a building resident. Please identify the discrepancy, and any impact on dose or risk estimates such modification may have. If the ISOU RIWP provides a more conservative approach, modify the RI to reflect the ISOU RIWP approach.		Appendix B Section B-2.2.3 in the RI WP identified the industrial worker as the limiting receptor for calculating a DCGL for building surfaces, which was evaluated in the BRA. Section B-2.2.2 presented potential receptors that were considered candidates for being considered as a limiting receptor. The discussion of these other receptors was not intended to introduce them as receptors that were committed to being evaluated in the BRA. There is no discrepancy and no impacts to dose/risk estimates in the BRA.
22		Section 6.1, *Human Health Risk Assessment* and Appendix K Section K2.0, *Human Health Risk Assessment,* sets cancer risk threshold to 1.0E-05. Table 6.2, *Summary of Risk Characterization Results for Inaccessible Soil and Soil on Exterior Surfaces of Buildings and Structures,* fails to recognize exceedance of threshold at or greater than 1.0E-05. Please explain this discrepancy.		Interior and exterior building surface data have been reevaluated using new surface PRGs derived as discussed in the response to comment 9 above. In the revised HHRA, comparisons are made to the USEPA's target cancer risk range, rather than to a risk of 1E-05.
23		For Appendix K Section K2.1, *Introduction,* note that the reference material *Exposure Factors Handbook,* (USEPA 1997a) is outdated. The current guide is *Exposure Factor Handbook: 2011 Edition; EPA/600/R-0901052F;* September 2011. Modify the reference accordingly. Default exposure factors may need to be revised, based upon more current		Based on a review of the current version of USEPA's Exposure Factors Handbook (made available to USACE on 2/15/2012), the skin surface area, used in the evaluations of worker dermal exposures to metals in soil, is being revised from 2,479 cm^2 to 3,890 cm^2. By itself, this change does not affect the outcome of

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		guidance.		the metals risk characterization.
24		For Appendix K Section K2.3, *Exposure Assessment,* discuss exposure to radon and progeny.		See response to comment 19 above.
25		For Appendix K Section K2.3.1.1, *Exposure Point Concentrations for Inaccessible Soil, Sewer Sediment, and Soil Adjacent to Sewer Lines,* use of one-half the detection or quantitation limit in the estimation of the ninety-five percent upper confidence limit (95% UCL) is not recommended when using current ProUCL software. Methodology for assessing the 95% UCL using datasets with nondetects is provided in the document *ProUCL 4.00.02 Users Guide; EPAl600/R-07/038;* April 2007. Prior to developing a 95% UCL, an outlier analysis must be performed on the dataset. ProUCL software can perform this function. All outliers should be considered for hotspot analysis. Hotspot analysis should evaluate whether the contamination is a principal threat waste (see EPA guidance *A Guide to Principal Threat and Low Level Threat Wastes;* Superfund Publication 9380.3-06FS; November 1991), whether the hotspot presents excess risk for		Current ProUCL guidelines do not preclude the use of half detection limits (DL/2), though USEPA's ProUCL Technical Guidance recommends that the DL/2 method not be used because of the availability of other methods (e.g. Kaplan Meier and bootstrap methods) that perform better statistically for data sets that contain even a small percentage of non-detects (e.g., as low as 5 – 10%). According to USEPA's ProUCL Technical Guidance, the DL/2 method had been USEPA's recommended and most commonly used method until recently; therefore, it is still incorporated into ProUCL for historical reasons. Historically, the DL/2 method has always been used at the St. Louis Sites for statistical evaluations of chemical data, particularly as part of PRARs. Therefore, for consistency with the work that has been done for years under the 1998 SLDS ROD, USACE does not plan on changing the method for evaluating non-detects in ISOU metals data sets. Although it is agreed that outliers are not desirable to have in a dataset because of resulting uncertainties in the risk and dose, the uncertainties introduced by the presence of right-tail outliers would bias the dose and risk assessment toward health-conservatism. However, a statistical outlier result or location may not always equate to a location being a

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		any given pathway for current and future receptors, and whether the hotspot area contains sufficient data points to determine if the area meets release criteria (i.e. 100 meters square area).		"hotspot" in terms of risk and dose. The presence of hotspots are being determined based on risk and dose in the RI/BRA, as well as additional evaluations in the FS, rather than on statistics, and will become more of a focus during the FS. Therefore, UCLs were not revised in the manner suggested by this comment.
26		For Appendix K Section K2.3.1.1, it is unclear which receptors will be assessed for exposure to soils adjacent to sewers. This section references Chapter 4, which generically assesses the nature and extent, using what is assumed to be the most conservative exposure scenario or UMTRCA screening levels. UMTRCA screening values are not receptor-specific, and the subsurface screening value is not health-based (i.e. protective of unrestricted use and unlimited exposure (UUUE)). Before the UMTRCA values are used, they should be proven to be protective using the current CSM. After determining if the UMTRCA values are protective, quantitative data adjacent to sewer lines should be included in the 95 %UCL for soils to assess dose and risk for inaccessible soils and site wide soils for current and future construction workers and industrial worker. Also note that according to the CSM provided within the ISOU RIWP, the current and future construction worker is to be exposed not only to inaccessible soils, but to contaminated drains and sewers. Contaminated drains and sewers were assumed to include sediment. Revise exposure pathways for the RI construction worker to include soils adjacent to the sewers as well as sediment.		See response to comment 4 above. The CSM has been refined since the RIWP to indicate that the workers most likely to be exposed during outside sewer line work will be the utility workers (e.g., MSD workers). The construction worker is not being evaluated for exposures to soils adjacent to sewer lines.
27		For Appendix K Section K2.3.1.2, *Radiological Exposure Point Concentrations for Soil on Building Surfaces,* activity fractions are discussed when		See response to comment 7 above.

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		partitioning gross alpha counts. However, the activity fractions are not provided. It is apparent that on many of the sites in this RI, Ra-226 and Th-230 exist proportionately higher in activity than other radionuclides. This is demonstrated in Table 4-2 for DT-2, DT-4, and DT-6. Given these values, DHSS recommends that either site-specific ratios using soil data be developed, or samples (i.e. quantitative analysis for removable and fixed alpha) be collected in order to properly apportion gross alpha. All results can then be compared to Table K-6A, *St. Louis Downtown Site-specific Soil Activity Fractions,* as noted in the text.		
28		For Appendix K Section K2.3.2, *Identification of Land Use and Potential Exposure Scenarios,* the construction worker is projected to work on a project for no longer than 90 days. Not being familiar with the average construction duration of a St. Louis construction project, one could assume that construction of a large structure could take much longer than 90 days. This is considered uncertainty, which conceivably could be assessed using probabilistic assessment ranging from 90 days to 250 days (a typical working year). At a minimum, this may be assessed to determine if this is a candidate for ALARA evaluation.		90 Days per year is assumed to be the amount of time out of the 250 days per year that a construction worker is engaged in soil-contact-intensive activities. This is more conservative than the 25 days/year assumed for construction worker exposures in the 1993 BRA (Table 3.28).
29		For Appendix K Section K.2.3.2, the recreational scenario assumes 1 foot of soil cover, which is based upon the depth to exceedance of screening values. Given radionuclides are detected above 1 foot, then the upper soil profile should be included in the dose and risk assessment. This is of particular importance given external is one of only two pathways assumed for this receptor; the other being inhalation. The total depth of evaluation for a current scenario should include all soils to a depth at which external dose/risk		The recreational user was conservatively evaluated assuming a 1-meter of cover. This is a conservative evaluation because the shallowest depths of a PRG exceedance at the levee was 6 ft. In order to demonstrate health protectiveness to the recreational user in response to the comment, two additional RESRAD scenarios were run. **"Scenario 1"** was run using all data that were used in the RI/BRA run, but using a cover depth of 0 meters,

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		is minimal (i.e. 2 meters), as well as the time period to 1,000 years to identify all possible combinations of risk resulting from the "Contamination Zone Erosion Rate" and assumptions within "Transfer Factors" values utilized for the RI in RESRAD. A future scenario should assume mixing of the entire soil profile.		rather than 1 meter. This was done to determine the dose/risk for a situation in which all soil is mixed under a future scenario (per the comment). The resulting dose and risk for this scenario was 0.2 mrem/yr and 1.0E-06, respectively. Because location HTZ76785 is located approximately 5 feet from the levee, the sample is still included in the calculations. For **"Scenario 2,"** only surface soil data (0-1 ft) collected from throughout DT-2 were used to calculate the EPC, with the cover depth of 0 meters being entered in RESRAD. The resulting dose and risk for this scenario was 0.02 mrem/yr and 1.2E-07, respectively. In summary, these additional RESRAD runs support the original runs in the RI/BRA that there is no unacceptable dose or risk expected for the recreational user at DT-2. Contrary to the comment, it should also be noted that the RI/BRA RESRAD evaluations for the recreational user, as well as those described for Scenarios 1 and 2 above were conducted assuming three pathways (soil ingestion, dust inhalation, and external radiation), rather than just two pathways. The comment also mentions transfer factors, but those aren't applicable to the recreational user scenario.
30		Appendix K Section K2.3.2, *Tier* 1 *Evaluation,* page 13, first paragraph discusses inaccessible scils as sitewide accessible soils for the industrial worker. Previous discussion notes that both a tier 1 and 2 evaluation are to be performed for this receptor, corresponding to a tier 1 being inaccessible soils and a tier 2 being a sitewide (combined inaccessible and accessible soil.) This is a tier 2 evaluation being discussed in the tier 1 section. If this is a mistake, please revise.		In the Revision B RI/BRA, the text was discussing property-wide inaccessible soil areas, being evaluated as accessible soil areas. The text was not discussing actual accessible soil areas, as defined under the 1998 ROD, that were later introduced into the Rev B Tier 2 evaluation. Confusion is probably occurring because of the mention of "property-wide" and "accessible" in the same sentence (see second sentence of first paragraph on page K-13 of the Rev B document. The term "property-wide inaccessible soil" was often used to distinguish from the inaccessible soil in the small

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				elevated measurement areas of inaccessible soil. To alleviate this confusion, the term "property-wide" has been removed when discussing all inaccessible soil areas across a given property. The search and replace has been done throughout the document.
31		According to Appendix K Section K2.3.2, *Tier* 2 *Evaluation,* a second tier evaluation involves calculation of property-wide EPCs by combining and area-weighting of inaccessible soil EPC determined during Tier 1, with corresponding accessible soil EPCs that were calculated during preparations of previous post-remediation/final status survey decision documents. The distribution may differ for the two datasets, prompting an inaccurate 95% UCL. Data for both inaccessible and accessible soils should be combined into one dataset, and run within ProUCL.		Please note that in the revised RI/BRA, the area-weighted average for dose and risk is calculated for combined inaccessible and accessible soil evaluations, as opposed to EPCs. Combining all inaccessible and accessible soil data into one dataset to calculate EPCs would result in giving equal weight across all accessible and inaccessible samples at a property. This in turn could potentially "dilute out" the impacts of elevated inaccessible areas, or hotspots, as risk driver locations in the combined EPC, given that many of the accessible areas have been remediated. For this reason it is preferred that the area weighting be retained, realizing that there is a possibility of the occurrence different data distributions between the inaccessible and accessible soil dataset for a property.
32		For Appendix K Section K2.3.2, there may be site-specific considerations that should be made prior to assuming that exceedance of tier 1 for an industrial worker is not sufficient grounds to carry a site to the Feasibility Study (FS). For example, one specific consideration that is necessary is to identify any pathway-specific exposure domains that do not adhere to a sitewide exposure scenario. For instance, the footprint of a building and contamination within 100 feet of the foundation are typically included into the vapor intrusion for radon pathway. Also, it appears that some buildings (i.e. DT-6) have earthen floors, which are directly accessible soils. Additionally, exceedance of risk and dose thresholds may occur at the tier 1 stage as a result of projected exposures to soils beneath the building itself.		In the revised HHRA, evaluations were conducted to determine the dose and risk status of the overall SLDS study area (i.e., sitewide), as well as the status of each property. Site-specific considerations, such as the examples cited by the comment that were previously evaluated as elevated measurement areas in the Revision B document, have been removed from the revised HHRA. These evaluations will be a focus in the FS.

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		Therefore, the decision to carry a site into the FS based upon an inaccessible soil versus a sitewide soil evaluation should be evaluated on a site-by-site basis, and relative to the dose and risk derived at either tier.		
33		For Appendix K Section K2.3.2.2 *Inaccessible Soil in Elevated Measurement Areas,* elevated measurement area was assumed to include elevated measurement sampling locations, along with immediately adjacent sampling locations where COPC concentrations are less than screening levels. Bounding elevated measurement areas to include less than screening level values may be inappropriate, as the process of selecting sample locations is arbitrary and in all likelihood will result in an artificially lower 95% UCL. Sample results to exclude are those resulting from previous removal actions, outside of the "inaccessible" boundaries, and not pathway-specific. Sample areas to consider may be bounded by 40 Code of Federal Regulations (CFR) Part 192 rules and MARSSIM survey unit areas utilized during final status surveys. The premise of utilizing the CFR and MARSSIM is to assure data density is sufficient to properly characterize the area (i.e. 100 meters square). Area weighting of samples should be considered.		The HHRA has been revised to evaluate sitewide and property-specific doses and risks; therefore, information relevant to the evaluations of elevated measurement areas has been removed from Section 6 and Appendix K. Section 6.1.2.2, as written in the Revision B RI/BRA, has been removed from the document. The dose and risk evaluations of elevated measurement areas will be a focus of the FS.
34		For Appendix K Section K2.3.2.4, *Sediment in Sewer Lines,* the pathways of exposure lack external gamma, as identified in Figure A-1 of the ISOU RIWP. Revise accordingly.		The absence of an external gamma pathway from the bulleted list of exposure routes reflects the fact that no radiological COPCs were identified in sewer line sediments during preparation of the Revision B RI/BRA. However, because there are sediment data that exceed USEPA's risk-based PRGs in the revised (Draft Final) RI/BRA, the external gamma pathway has now been evaluated. The results of the evaluation show no exceedances of the target dose (25 mrem/yr) or USEPA's target risk range. Both the HHRA and CSM have been modified to reflect the potentially

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				complete external gamma pathway that was evaluated in the revised HHRA.
35		For Appendix K Section K2.3.2.4, the utility worker is discussed as having exposure to sediment within the sewer lines. However, according to Table 6-1, *Property and Media-Specific Receptor Scenarios for Evaluation in the Human Health Risk Assessment,* exposure for the same receptor is identified only to soil exterior to the sewers. Table 6-1 further identifies a sewer maintenance worker, not previously identified. This individual is being evaluated as having exposure to sediment within the sewer. Either this section or Table 6-1 needs to be revised to reflect the proper receptor and exposure media. Additional inconsistencies within the R1 regarding this receptor and exposure media should be revised.		Section K2.3.2.4 in the Revision B RI/BRA describes the receptor to sewer line sediment as being the sewer maintenance worker, which is consistent with Table 6-1. USACE sees no inconsistency; therefore, no change was made.
36		For Appendix K Section K2.3.2.3 *Soil of Surfaces of Buildings and Structures,* the contamination source, volumetric versus area, is not discussed. If volume is eliminated, is there laboratory data that provides verification? If laboratory samples were not collected, provide justification as to why.		None of the MED/AEC process buildings remain at SLDS. The contamination on building/structural surfaces resulted from airborne emissions during MED/AEC activities and dust. These sources would not result in significant volumetric contamination as would be the case for building surfaces that were used for processing uranium. Therefore, any contamination on structures would be surficial.
37		For Appendix K Section K2.3.3.1, *Estimation of Radiological Dose and Risk,* the listed reference *Reassessment of Radium and Thorium Soil Concentrations and Annual Dose Rates,* is cited in EPA Directive 9200.4-25, *Soil Cleanup Criteria in 40 CFR Part* 192. The EPA directive does not indicate that UMTRCA subsoil cleanup goals are protective (see comment 6 above). Revise the bullet point item to reflect actual findings, as noted in the EPA directive.		USEPA Directive 9200.4-25 does not specifically cite *Reassessment of Radium and Thorium Soil Concentrations and Annual Dose Rates.* The use of RESRAD codes for modeling dose and risk is an acceptable industry practice among prominent federal agencies.

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38		For Appendix K, Section K2.3.3, *Methodology for Quantifying Dose,* chemical intake is described as exposure to a chemical constituent with a receptor per unit body weight per unit of time. Technically, inhalation intake for non-radionuclide constituents is not normalized to body weight. The RI does acknowledge this in Appendix K, but should be recognized here for technical accuracy.		The following revised text is now presented in Section K2.3.3: *"Chemical dose (also referred to as "intake") is a measure of exposure expressed as the concentration of a constituent that has come in contact (via ingestion or dermal contact) with a receptor per unit body weight per unit of time (milligrams of chemical per kilogram body weight per day [mg/kg-day]). For quantifying exposures via inhalation of dusts, an exposure concentration (EC) is determined as the time-weighted average concentration ($\mu g/m^3$) derived from measured or modeled contaminant concentrations in air, adjusted based on the characteristics of the exposure scenario being evaluated (USEPA 2009b)."*
39		For Appendix K, Section K2.4.1, *Radiological Toxicity Assessment,* bullet point one notes that the radiological endpoint is fatal cancer. Radionuclide slope factors are provided for cancer mortality (fatal cancers) or morbidity (fatal plus nonfatal cancers). DHSS and EPA both support use of the morbidity slope factors. Revise this bullet point item to reflect the non-fatal endpoint, and use the Health Effects Assessment Summary Table (HEAST) morbidity slope factors for risk assessment.		The text was revised to indicate radiological endpoint is based on morbidity. The current versions of RESRAD and RESRAD-Build incorporate the updated 2001 HEAST morbidity slope factors as part of FGR-13. These updated slope factors were used for the radiological risk assessments.
40		For Appendix K Section K2.6.5.1, *Toxicity Assessment for Radiological Contaminants of Potential Concern,* uncertainty regarding RESRAD's use of the most conservative dose conversion factor (DCF) does not address the lack of speciation. Nuclear Regulatory Commission guidance (NUREG) (i.e. NUREG/CR-5512, *Residual Radioactive Contamination from Decommissioning)* requires use of the most conservative DCF when speciation is not performed. Please acknowledge the lack of speciation		There is not a lack of speciation for this site. Speciation was determined in *Determination of the In-Vitro Dissolution Rates of Selected Radionuclides in Soils and Subsequent ICRP 30 Solubility Classifications for Dosimetry.* Additionally, RESRAD used the most conservative DCF.

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		in the uncertainty.		
41		For Table K -6A, the activity fractions are different from the site-specific laboratory data for some of the sites provided in this RI. Comment 27 above provides redress regarding use of the St. Louis downtown specific activity fractions. The potential impact to radionuclide-specific alpha exposure point concentrations would be to underestimate concentrations of external risk-drivers including radium-226, (with a projected fraction of 0.056), in relation to U-238 and U-235 (with a combined fraction of 0.654). Given the RI assumes significant contributions to building-related alpha is removable (soil dust), and laboratory data is not available to quantitatively assess radionuclides, then site soil ratios apply. Therefore, activity fractions should be calculated for each site, and Table K-6A revised to include the calculations.		See response to comment 7 above.

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