8139

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 R. Cotner
FUSRAP Program Manager

MDNR Comments on the SLDS Remedial Investigation and Baseline Risk Assessment, Revision B, dated November 10, 2011

Comment #	Page/ Paragraph	Quote	Comment	Response
1	General	*N/A*	The RI/BRA references the RI Work Plan quite often throughout the document. This makes it difficult for the reader to understand methodology decided upon in the work plan. The RI/BRA should be a standalone document with minimum referencing to the work plan. Instead, the reader often has to refer back to the work plan in order to understand what methodology was used. The Department does not expect the entire work plan to be restated in the RI. However, the Department expects that a brief explanation on the methodology used be restated in the RI for the reader.	Additional information from the RI WP has been added throughout the RI Report.
2	General	*N/A*	Please add a section within the document discussing the applicable or relevant and appropriate requirements (ARARs, e.g., Mo Universal Environmental Covenant Act, UMTRCA), and to be considered (TBCs, e.g., EPA guidance on LTS) that will be investigated as part of this operable unit.	Based on the suggested RI Report format presented in USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, a section to specifically address ARARs is not required in an RI Report. Therefore, instead of adding an ARARs section, the following text has been added to the end of Section 4.1 to provide a preliminary identification of the primary ARARs: *"ARARs are also used to select the remediation levels in the ROD The State of Missouri has proposed the following requirements as potential ARARs:* • *Uranium Mill Tailings Radiation Control Act (UMTRCA) (40 CFR 192.12(a), (b); 192.21; 192.22; 192.02(a); 192.40; 192.41)* • *Office of Solid Waste and Emergency Response (OSWER) 9200.4-18* • *OSWER 9200.4-23*

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				• *OSWER 9200.4-25* • *Missouri Clean Water Act* • *Missouri Water Well Driller's Law (RSMo 256.600 and 256.670) and Regulations (10 Code of State Regulations [CSR] 23)* • *Missouri Risk Based Corrective Action (MoRBCA) guidance of long term stewardship* • *Missouri Environmental Covenants Act (MoECA)* *The inclusion of these potential ARARs does not constitute applicability or USACE acceptance. The potential ARARs will be evaluated during subsequent CERCLA documents in accordance with the time frames established in the NCP."* A thorough discussion of ARARs will be presented in the draft FS. In order to allow full consideration of MDNR input, USACE requests MDNR's list of suggested ARARs.
3	General	*N/A*	In preparation for the upcoming Feasibility Study, the Department would like the USACE to discuss within the text regarding institutional control mechanisms the USACE will investigate for this operable unit.	Based on the suggested RI Report format presented in USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, a section to specifically address institutional control mechanisms is not required in an RI Report. Institutional control mechanisms will be discussed in the FS. The RI Report will discuss the results of the RI and the BRA.
4	Page 3, paragraph 1	*The 1998 ROD was published by USACE in consultation with USEPA...*	Please change to "The 1998 ROD was published by USACE in consultation with and approval from the USEPA" or similar verbiage.	Sentence changed to *"The 1998 ROD was published by USACE in consultation with USEPA and with concurrence from the Missouri Department of Natural Resources (MDNR)."* This language is consistent

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				with that previously used in the Record of Decision for the accessible operable unit for SLDS (page iii).
5	Page 5, last bullet	*Plant 7W was used previously by MED/AEC and by Mallinckrodt for processing radioactive feed materials. Plant 7W is currently excluded from the ISOU because historic sources of contamination have not been determined.*	The Department understands that the USACE and Mallinckrodt have yet to determine the source of contamination (MED/AEC or Mallinckrodt). If it is determined that historic sources of contamination on 7W are the responsibility of the USACE and are inaccessible, how will that information be added to this report and subsequent documents?	How the data are added will depend on when the determination of the source is made. If the determination is made prior to the ROD being signed, then an appendix will be added to the current document (RI or FS) and the results of the evaluation will be incorporated into that document (RI or FS). If the determination is made after the ROD is signed a standalone document will be written to cover Plant 7W.
6	Page 15, paragraph 3	*The 1993 BRA concluded that the primary radioactive contaminants in soil and sediment at the SLDS were Ra-226, Th-232, Th-230, U-238, and U-235 and its decay products (including Ac-227 and Pa-231).*	This should also include Ra-228. The 1998a ROD states, "Soils at SLDS were characterized in the BRA as posing potentially unacceptable risks to human health and the environment due to the following MED/AEC related radiological COCs: Th-230, Th-232, Ra226, Ra-228, U-235, U-238, and their respective decay products" (p. 38).	The 1993 BRA did not include Ra-228 as a primary radioactive contaminant of concern. Changed to read "*The 1993 BRA concluded that the radionuclides of concern are those found in the U-238, Th-232 and U-235 decay series – primarily U-238, Ra-226, Th-230, lead (Pb)-210, Ac-227 and Pa-231.*"
7	Page 19, paragraph 3	*Systematic or random sampling for metal PCOCs was not completed because it was expected that areas slated for biased sampling would best characterize any metal contaminants as metals have predominately been found commingled*	Page 43 of the RI Work Plan for the ISOU states that, "If the number of biased soil sampling locations is not adequate for risk assessment purposes (section 3.7.4.3), then locations proposed for systematic sampling will be also used." Please verify in the text that the biased sampling for metals was adequate for the risk assessment evaluation.	The metals data collected during the RI were sufficient for supporting risk characterization. Also, Section 7.4.1 states that additional sampling strategies (for radiological and/or metals) will be developed to support remedial alternatives evaluations, remedial design, and possibly for monitoring as well.

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		with radiological PCOCs in the accessible portions of SLDS.		
8	Page 27, paragraph 4	*The SLDS properties are currently zoned industrial, which 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.*	Please cite within the text where this information was obtained. Additionally please include the zoning excerpt in the appendices for regulators to review. The Department wants to ensure that residential areas are not allowed within this area since not all industrial zonings preclude residences. Additionally, if the USACE believes that the area will remain industrial, please state that the appropriate land use controls will be evaluated in the Feasibility Study.	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 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,

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				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. As requested, appropriate land use controls will be evaluated in the Feasibility Study.
9	Page 28, paragraph 4	*HU-B is one of the principal aquifers in the St. Louis area. It qualifies as a potential source of drinking water under the Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy (USEPA 1988b). However, expected future use of HU-B as a drinking water source at SLDS is highly unlikely for several reasons: the industrial setting, the*	The USACE needs to state within the text that they are still evaluating the ground water under the 1998 ROD for the Accessible Soils and Ground Water Operable Units at the SLDS. Any conclusions regarding impacts to ground water are ongoing. Additionally, as stated in the 1998 ROD, the Department stated and reaffirms its statement that groundwater (in unit B) is a viable water source and must be protected to the extent that standard water treatment applications would be used to make the use acceptable as potable water.	The following statement has been added as the last sentence in Section 3.3: *"USACE continues to evaluate ground-water impacts beneath the SLDS under the 1998 ROD."* Evaluation of the ground water is being conducted under the 1998 ROD. This evaluation will include a determination of whether there is a need for a remedial action such as some type of water treatment.

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		site's proximity to the Mississippi and Missouri Rivers (i.e., major water supply sources), and the poor natural water quality of the HU-B.		
10	Page 29, paragraph 3	*Overall, no potentially important habitats for biota occur either on-site or adjacent to the SLDS (DOE 1993).*	Please include a discussion on the information obtained from the ecological assessment of the site. Additionally, this statement may need modification depending on additional information requested in the ecological risk assessment (see comments 36-41).	The cited sentence has been revised to read: *"Based on the "Environmental Assessment for Biota" presented in the 1993 BRA, and the conclusions of the Ecological Assessment of this RI/BRA report (Sections 6.2 and Appendix K Section 3.0), no potentially sensitive habitats for biota occur either on site or adjacent to the SLDS (DOE 1993)."*
11	Page 41, paragraph 4	*The preferential pathway investigation indicated that Ra-226, which decays to radon-222 (Rn-222), was at background concentrations. The systematic and biased samples collected beneath Building 25 during the RI have net Ra-226 concentrations less than 2 pCi/g. The Ra-226 results support the conclusion that elevated radon concentrations due to residual radium is not present at levels such that it could be of concern.*	Please explain within the text whether parent products (Th-230, U-238) of Ra-226 are at concentrations that could cause elevated concentrations of Ra-226 (and eventually Rn-222) in the future when they decay.	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 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 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 1,000 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*

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				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."
12	Page 42, paragraph 2	*Additional sampling adjacent to Building C and L may be required to vertically delineate contamination in this area for risk evaluation.*	Please explain why this additional sampling was not performed during the RI process. If additional sampling is required, how will the sampling data and subsequent risk evaluation be presented to regulators for review?	Section 4.0 was re-written and streamlined due to a change in screening levels (now PRGs). However, the cited sentence should have stated that additional sampling adjacent to Buildings C and L may be required for vertical delineation during remedial design and the risk evaluation performed following any remedial action. No additional sampling is required for risk analysis.
13	Page 45, paragraph 1	*The RI WP-proposed sampling depth in this area was changed from 23 ft to approximately 6 ft, which is approximately the same depth below cover material of the accessible soil excavation near Building 510 (IT 2000).*	The RI WP specified that "all of the samples collected within the Building 510 footprint will be collected to a minimum depth of 6.9 m (23 ft) because the accessible soil within the 50-series excavation area was to this depth" (p. 64). The reason provided for not sampling to this depth is confusing. If the depth of accessible contamination in this area went to 23 ft, then inaccessible sampling in this area should also be to 23 ft.	When Section 4 was revised to incorporate new PRGs, this statement was deleted. However, the 50 Series Excavation Area in Plant 2 had a maximum depth of approximately 23 ft. The maximum depth was toward the middle area of the excavation and became shallower at the edges. The maximum excavation depth adjacent to Building 510 was at the northeast corner of the building and was approximately 9 ft in depth. This was the reason for reducing the sample depths. Sample locations SLD125369 and SLD125377 were sampled to 9 ft and 7.5 ft, respectively, before auger refusal.
14	Page 49, paragraph 5	*The analytical results and SORN values for each sample collected at Plant 2 during this RI are presented in Table E-7.*	Please change "Plant 2" to "Plant 3".	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs.
15	Page 65, paragraph 1	*Two biased soil sample locations proposed in the RI WP on the RR track*	Please provide a better description on which samples were not collected and the reason they were not collected per the RI WP.	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. However, one proposed biased sample was located south of the

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		at other areas adjacent to the accessible soil excavation areas were not collected but adequate samples exist along the RR track to evaluate the lateral extent to the west and east.		remediated accessible soil area, on the northern track, west of sample SLD118893 and the other was located west of SLD118917 by the remediated accessible soil area. See Figure E-18.
16	Page 70, paragraph 4	*N/A*	Please put a space between "Figure" and "C-21".	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs.
17	Page 73, paragraph 2, Figure C-24	*Samples were also collected at several biased locations (SLD125237, SLD125241, SLD125245) in order to verify the radiological concentrations in three previous surface soil samples (SLD00963, SLD00975, and SLD00995) collected in 1999.* *Due to an oversight in the field, metal samples from four locations along Mallinckrodt Street were not collected, per the RI WP.*	Please explain the rationale for choosing resample locations for the samples collected in 1999. From Figure C-24, it appears that samples SLD125237 and SLD125245 were collected within approximately 12 feet of the 1999 sample. Sample SLD125241 appears to have been collected more than 25 ft from the 1999 sample. Please explain how sample SLD125241 is representative of the 1999 sample being 25 ft from it when the other two samples were taken closer to their respective samples. Please explain in the text the impact of not having these results, whether or not a data gap for metals exists in this area and whether metal sampling is needed.	Due to the age of the previous samples and not having depth information, these areas were proposed for re-sampling. Due to interference from utilities the sample locations had to be off set. Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. There were two metals samples collected on Mallinckrodt street during the accessible soil characterization efforts. The sampling results from these two sampling locations exceed the soil background value and the risk-based PRG for arsenic. The results from the analysis of cadmium did not exceed the screening levels. Therefore, arsenic was evaluated further for Mallinckrodt Street in the BRA.

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18	Page 76, paragraph 5	*At two locations, SLD120223 and SLD120227 (Figure C-28), soil samples were only able to be collected to a depth of approximately 3 to 4 ft (as opposed to the planned 6 ft depth) because of auger refusal or because soil was saturated.*	Provide an explanation within the text on the impact of the missing samples and whether contamination is suspected at deeper depths.	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. The following text was added as the first paragraph in Section 4.5: *"COPCs were conservatively identified based on a single exceedance of their risk-based PRG and are applied on a sitewide basis. These COPCs are carried forward into the BRA. No COPCs were eliminated from being carried into the BRA based on their results being less than BVs. Based on the conservative inclusion of the COPCs to be carried forward in the BRA, potential impacts for defining the nature and extent of contamination due to deviations from the RI WP, including modification of sampling locations and limiting of sampling depth, are minimal. The need for additional sampling will be evaluated during the remedial design phase after RGs are developed for the COCs."*
19	Page 78-79, Table 4-4	*N/A*	Suggest adding a footnote for the values that exceed the screening level but where background has not yet been subtracted.	A footnote was added to Table 4-4 (now Table 4-6) that reads as follows: *"The natural occurring radioactivity from clay/ceramic brick caps, as discussed in Section 2.2.2, has not been subtracted from the reported results."*
20	Page 81, paragraph 3	*Building 506 was proposed for a scoping survey but, upon field inspection, the building was determined to be new construction and is located approximately 25 ft to the south of the original location.*	Please provide additional information within the text on approximately when the building was constructed.	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. The requested information is no longer applicable to the new format; however, Building 506 was constructed in 2008.
21	Page 96, paragraph 2	*This sewer line is located*	Page 93 of the text states, "Concentrations of radionuclides detected in samples from	Section 4.0 was re-written and streamlined due to the change from screening levels to

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		approximately 9 to 10 ft bgs, and the contamination extends from approximately 7 to 12 ft bgs.	SLD124540 were highest in the deepest sample, thus indicating that the vertical extent of contamination in this boring is not fully defined." Please correct the text to clarify whether contamination may extend deeper than 12 ft bgs. Furthermore, does the USACE plan to fully characterize the vertical contamination in this area?	risk-based PRGs. The requested information is no longer applicable to the new format; however, concentrations of radionuclides detected in samples from SLD124540 were highest in the deepest sample, which was collected between 11.5 and 12 ft bgs. There is a potential that contamination extends to depths below 12 ft bgs at this location. No additional sampling is required for risk analysis.
22	Page 103, paragraph 2	*Future soil sampling is planned adjacent to the 30in sewer line during remediation activities that are currently being conducted under the 1998 ROD in an area immediately east of the RR tracks. Because the recent samples are in closer proximity to inaccessible portion of the sewer line underlying the tracks than the 2006 samples, they will replace the 2006 soil data when their analytical results become available. At that time, the portion of the 30-in sewer beneath the BNSF RR line will be re-evaluated by comparing the recent sampling results to*	When this information is obtained, please share the results with both the USEPA and MDNR staff for review. If the results differ significantly from the 2006 data, how will it be included in the RI and risk assessment process?	The recent samples were collected along a portion of the 30-in sewer. The new sampling data will not change the results of the RI screening, it will be presented and evaluated in the FS.

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		the RI screening levels for radiological and metal PCOCs.		
23	Page 103, paragraph 3	*However, the concrete cradle may have limited or prevented the migration of radiological COCs from the sewer into the surrounding soil.*	This statement is assuming that the concrete cradle is intact and does not have any leaking cracks. If this is correct, please clarify the text to state such.	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. Although cracks in the cradle were not directly observed, it is assumed that it did not completely prevent migration of radiological COPCs to the surrounding soil.
24	Page 116, Section 5.1.1 Inaccessible Soil Associated Buildings and Structures	*N/A*	Please explain why the areas listed in this section do not include all areas mentioned in Table 4-8. For example, inaccessible radiological contamination was located under building 25 on Plant 1, yet is not listed in this section.	Section 5.1.1 has been re-written due to a change in PRGs.
25	Page 123, paragraph 2	*Aside from particulate emissions, gaseous emissions of Rn-222, a decay product of Ra-226, could occur from all inaccessible soil areas. However, given the relatively low levels of site-related Ra-226 concentrations measured in the soil, site-related Rn222 is not considered to be significant, and therefore, was not investigated during the RI.*	Additional information is needed in this section in order to support the statement that Rn-222 is not considered significant and will not need further investigation under this RI. The USACE needs to have an in-depth discussion within the text, including: • An analysis of the current concentrations of Ra-226 in the soil. • What concentration of Ra-226 is considered significant vs. non-significant. • How the USACE determined the point where the concentration of Ra-226 becomes significant vs. non-significant. • If there is or isn't a significant migration pathway for Rn-222 in the soil.	See also the response to comment 11. 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 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 1,000 year period (i.e., 5 pCi/g in surface soil and/or 15 pCi/g in subsurface soil).

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			• Calculations showing whether Th-230 and U238 will decay overtime to Ra-226 in concentrations that will result in elevated concentrations of Rn-222 that could pose a human health hazard.	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 North - South Storage Building. The other areas are either not below occupied or habitable buildings or it will take more than 1, 000 years for the Ra-226 to build up from the decay of Th-230 to achieve 40 CFR 192.12(a) 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 North - South Storage Building; however, monitoring results are not yet available to determine associated risk. Results for the Rn-222 monitoring will be presented in the Annual Environmental Monitoring Data and Analysis Report for Calendar Year

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				2012. Potential risk due to Rn-222 exposures will be determined when Rn-222 monitoring results become available.
26	Page 123, paragraph 4	*Elevated activities measured on exterior building/structure surfaces are essentially fixed and are not expected to be removable.*	What does "essentially fixed" mean? The text needs to be modified to clarify what is meant by this statement. If the contamination is not currently removable but can become airborne in the future through oxidation or weathering of material then please state that in the text.	The first two sentences of the paragraph were revised to read as follows: *"Elevated radioactivity measured on exterior building/structure surfaces (i.e., as opposed to interior surfaces) could gradually become removable over time. Prolonged oxidation of the metallic surfaces may result in loose contaminated particulates that could become removable by high wind agitation and precipitation."*
27	Page 123, Section 5.2.2	*N/A*	This section discusses potential impacts if inaccessible contamination leached into ground water. Any inaccessible soil contamination that leaches into ground water would fall under the 1998 ROD for accessible soils and groundwater and would be evaluated accordingly.	The following sentence has been added to the end of the last paragraph of Section 5.2.2.3 of the revised RI/BRA Report: *"Although the contribution to ground-water contamination from inaccessible soil is expected to be insignificant, all SLDS ground-water contamination associated with past MED/AEC activities is being addressed under the 1998 ROD."*
28	Page 125, paragraph 2	*Surface water is this area would run directly into the Mississippi River.*	Last sentence, change "Surface water is" to "Surface water in".	The sentence has been changed.
29	Page 130, paragraph 4	*N/A*	Change C03 to CO3	The change has been made.
30	Page 138, last paragraph	*For consistency with the 1998a ROD....*	Please state within the text whether these values are also still relevant to the current and anticipated future site scenarios.	The following sentence was added after the discussion of the recreational user, further down in the same paragraph (penultimate paragraph in Section 6.1.2.1): *"These exposure scenarios are consistent with the current and anticipated future land use patterns expected for the ISOU."*
31	Page 143-144, Sections 6.1.2.4 Page	*N/A*	From reviewing the CSM presented in Figure A-1 of the RI Work Plan, the maintenance worker appears to have potentially complete and significant	The exposure scenarios have been refined since the RI Work Plan. The maintenance worker scenario has been retained as the receptor that is maximally exposed to

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	K-15-K16, HHRA, Sections K2.3.2.4		exposure pathways from both inaccessible contaminated soil and contaminated drains/sewers. The Department understood this to mean that the maintenance worker would be exposed to contaminated soil adjacent to sewer lines and contaminated sediment inside sewer lines. The Department believes that the risk assessment for the Sewer Maintenance worker should have both exposure pathways evaluated together as presented in the CSM instead of only from contaminated sediments in sewer lines.	sediments inside of sewer lines due to direct contact. The exposure frequency for the maintenance worker is assumed to be one 8-hour day per manhole, each year for 25 years. This is a conservative assumption because manholes and sewer lines, in reality, are maintained at a much lower frequency. Exposures to soil adjacent to sewer lines are evaluated for each borehole location. This scenario was refined to assume the utility worker (from the 1998 SLDS FS and ROD) as being the maximally exposed receptor who directly contacts excavated soil potentially impacted outside of sewer lines, while performing sewer line repair or replacement. The work at each borehole location is expected to be a once in a lifetime exposure event, lasting 8 hours per day, for 10 days (or 80 hours). Although the contaminants in the soil adjacent to sewer lines are characterized as having originated from sewer line sediments via leakage, each medium is evaluated as a separate source to assess the reasonable maximum exposures (RMEs) associated with each medium. This could determine the need for remedial action for the sewer line sediment or the soil adjacent to the sewer lines, or both media. Evaluating exposures to sewer line sediment and soil adjacent to sewers together would not facilitate a determination as to whether one of the sewer media (i.e., sediment versus soil), or both sewer media should be the focus of remedial action. Evaluating each medium as a separate source provides a more conservative evaluation of the RMEs

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				expected for receptors contacting those media.
32	Page 158, Section 7.3.2	*N/A*	The Remedial Action Objectives (RAOs) assume that the contaminated soil and sediment within this operable unit does not become accessible in the future. The upcoming Feasibility Study should have a discussion on what actions will occur if inaccessible soils become accessible, including an evaluation of land use controls, soil management plans, institutional control layers, and information tools.	Given that inaccessible soils were evaluated in the HHRA assuming no cover, and that the RAOs were derived based on the results of the dose and risk characterization, the intent of the RAOs is to always be protective of exposures to inaccessible soil and sediment. The feasibility study will discuss the actions that will occur if inaccessible soils become accessible.
33	Figure C-7	*N/A*	The figure indicates that the administration building has contamination above screening level criteria. The text stated that when background was subtracted from the value, the concentration was less than the screening level. Please correct Figure C-7 or the text.	The Appendix C figures have been revised based on other comments and have become the Appendix E figures; however, the blue shading of the Administration Building has been removed.
34	Figure C-23	*N/A*	From looking at Figure C-24, it appears that the eastern section of Former Salisbury Street Roadbed is not inaccessible. Please confirm that this is correct or if the map needs to be corrected. If the area is accessible, please explain why samples (SLD125279 and sLD125283) were taken in this location and the data used in the risk assessment. That is, if the area is accessible and contamination exists under it, then it should be remediated under the 1998a ROD and not be included in this RI.	The Appendix C figures have been revised based on other comments and have become the Appendix E figures; however, the eastern section of Salisbury Street is accessible. The samples from SLD125279 and SLD125283 were not used in the risk assessment. No remediation under the 1998 ROD is required.
35	Figure C-24	*N/A*	From looking at Figure C-24, it appears that the eastern section of Mallinckrodt Street by building 502 is not inaccessible.	The Appendix C figures have been revised based on other comments and have become the Appendix E figures; however,

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			Please confirm that this is correct or if the map needs to be corrected. If the area is accessible, please explain why samples (SLD125241, SLD125245, SLD125249, and SLD125253) were taken in this location and the data used in the risk assessment. That is, if the area is accessible and contamination exists under it, then it should be remediated under the 1998a ROD and not be included in this RI.	the eastern section of Mallinckrodt Street is inaccessible. The risk and dose assessment has been changed as appropriate.
36	Ecological Assessment Page K-41 through K44 and Appendix R	*N/A*	The Department believes that the Ecological Assessment is not adequate and needs to be rewritten as a formal screening ecological risk assessment. More information needs to be included to explain why there are not complete pathways for receptors. For example, the assessment and checklist do not explain why deep-rooted trees such as sycamores and cottonwoods, which send roots into the water table, cannot uptake radionuclides from inaccessible areas. Additionally, the assessment and checklist do not discuss whether burrowing animals such as ground hogs, moles, etc. could come into contact with inaccessible soils.	Additional pathway information has been added to the text, based on the revised CSM, to support the position that a more formal screening level ecological risk assessment (SLERA) is not necessary for the ISOU. An Environmental Assessment for Biota was performed as part of the 1993 BRA, which evaluated potential receptor exposures to soil (mostly accessible), sediment, and surface water. The environmental assessment concluded that due to the urban environment, limited wildlife habitat, and biotic diversity, the significance of the SLDS in regard to ecological resources is minimal. Therefore, all subsequent investigative and remediation activities conducted under the 1998 ROD have focused on protection from human health effects. However, as indicated in the *Second Five-Year Review Report for FUSRAP St. Louis Sites (September 22, 2010)*, "Statement of Protectiveness," the remedial actions being undertaken at the SLDS accessible OU, are expected to be protective of both human health and the environment upon completion. In comparison to the accessible media

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				evaluated in the 1993 environmental assessment, the potential for impacts to ecological receptors from ISOU media is significantly less for the following reasons. First, the potential for direct contact exposures to ISOU media is greater for human receptors than for terrestrial or aquatic species. Second, the presence of buildings/structures and consolidated cover (e.g. asphalt and concrete pavement) acts a physical barrier to direct contact exposures to inaccessible soils underlying those areas by terrestrial receptors. Third, the potential for subsurface migration to sensitive terrestrial or aquatic habitats (although none have been found to exist, per the Ecological Checklist in Appendix R), from inaccessible soil sources beneath structures and consolidated cover, is not significant. Finally, remedial actions that have been conducted at the SLDS, under the 1998 ROD, have reduced the likelihood that ISOU media will be impacted by accessible soil contamination. It is for the aforementioned reasons that the ISOU BRA does not include a comprehensive ecological risk assessment.
37	Appendix R Page 3, Question 20 and	*The use of ground water for potable water is prohibited by the City of St. Louis.*	Please include within the text that the 1998 ROD for SLDS stated that ground water in unit B (HU-B) qualifies as a potential drinking water source under EPA guidelines.	The following statement has been added under Question 20: *"As noted in the 1998 ROD (USACE 1998a), the Mississippi Alluvial Aquifer (HU-B) qualifies as a potential source of drinking water under the "Guidelines for Groundwater Classification under the USEPA Groundwater Protection Strategy" (USEPA 1988). However, the City of St. Louis explicitly forbids the installation of wells into the subsurface for the purposes of using the ground water as a potable water supply (Ordinance 66777, City of St.*

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				Louis 2005)."
38	Page 4, last paragraph	*Finally, there is no evidence of significant ground-water migration offsite to more sensitive aquatic habitats.*	Ground water does migrate offsite because it flows easterly towards the Mississippi River. HUB, which flows through the site, flows easterly and is hydraulically connected to the Mississippi River. Therefore, this statement needs to be rewritten to clarify what is meant by this. If the USACE meant to state that there is no evidence of ground water contamination offsite, then this statement also needs to be modified. The ground water evaluation, which is a part of the 1998 ROD (accessible soils and groundwater), has not been completed for the site. The Department feels that such a statement should not be included until the ground water evaluation is completed per the 1998 ROD.	The statement has been deleted and replaced with the following: *"Finally, there is currently no evidence of significant contaminant transport via ground water to more sensitive aquatic habitats offsite. However, further evaluation of potential risks to the environment from site ground water will be conducted as part of the Ground-water Remedial Action Alternative Assessment initiated under the 1998 ROD."*
39	Appendix R, Page 11, Question 4	*The site could provide limited habitat to urban-adopted migratory bird species such as robins.*	Killdeer have been witnessed to nest on areas of DT-2 (City Property).	The cited statement has been modified to read *"The site could provide limited habitat to urban-adopted migratory bird species, such as robins or killdeer."*
40	Appendix R, Page 11, Question 3	*Migration of contaminants from inaccessible soil is limited since most of these soils are covered by buildings, pavement or other impervious materials.*	The Department believes that migration of contaminants to ecological receptors needs to be evaluated in greater detail. The USACE needs to evaluate the potential exposure pathways from: • Uptake by tree roots (especially deep-rooted trees).	USACE believes that any migration of contaminants to ecological receptors would be limited at most and would not affect populations of receptors. There are very few trees on the levee itself (beneath which the soil samples were collected) because this area is maintained so that large trees do not grow and potentially affect the structural integrity of the levee. In addition, the largest vegetated area on the site is the area adjacent to the Mississippi River along the levee. The majority of this area is maintained as mowed turf grass. As a result, the number

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			• Burrowing animals (ground hogs, beavers). • Worms and insects that can be eaten by bird species.	of trees that could potentially be exposed to contaminants through root uptake would be limited. While burrowing animals could be exposed to contaminants if they burrowed into the inaccessible soils area, the pathway that would likely be the biggest concern is inhalation. However, VOCs are not PCOCs at the SLDS ISOU. Worms and insects would only be exposed to contaminants in the 0-1 foot interval. This is the top of the levee and essentially uncontaminated so birds would not be at risk from consuming these invertebrates.
41	Appendix R, Page 12, Question 8	*While it is possible that chemicals found on the site could leach or dissolve into ground water, there is no open pathway for ecological receptors due to the depth to ground water and the general lack of sensitive receptors.*	This does not evaluate the potential for tree roots to uptake contaminants from ground water and expose receptors if contaminants concentrate in the plants' leaves, bark, etc.	As discussed in response to comment 40, there are very few trees on the levee itself or near the levee. As a result, the number of trees that could potentially be exposed to contaminants through root uptake would be limited.

MDNR Division of Geology and Land Survey Comments on the SLDS RI/BRA for the Inaccessible Soils Operable Unit

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1	General	*N/A*	There were some samples that were not collected according to the work plan. Some sample locations were moved based upon site conditions; however, some samples or surveys were not conducted. Samples and/or surveying was not completed at the following locations: curb containment west of Building 8 in Plant 1; containment pad southeast of Building 6 in Plant 1; Building 123 in Plant 6E; salt domes at DT-4; AT&T complex at DT-6; and Mallinckrodt Street. All sampling and surveying deviations from the work plan should have detailed evaluations and discussions in the report that include the reason for the deviation and any impacts upon the risk assessment or RI conclusion.	Section 4.0 was re-written and streamlined due to the change from screening levels to risk-based PRGs. The following text was added as the first paragraph in Section 4.5: *"COPCs were conservatively identified based on a single exceedance of their risk-based PRG and are applied on a sitewide basis. These COPCs are carried forward into the BRA. No COPCs were eliminated from being carried into the BRA based on their results being less than BVs. Based on the conservative inclusion of the COPCs to be carried forward in the BRA, potential impacts for defining the nature and extent of contamination due to deviations from the RI WP, including modification of sampling locations and limiting of sampling depth, are minimal. The need for additional sampling will be evaluated during the remedial design phase after RGs are developed for the COCs."*

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