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

September 26, 2012

REPLY TO
ATTENTION OF

Formerly Utilized Sites Remedial Action Program (FUSRAP)

SUBJECT: Remedial Investigation and Baseline Risk Assessment Report for the Inaccessible Soil Operable Unit at the St. Louis Downtown Site
Final dated September 20, 2012

Mr. Branden Doster
Federal Facilities Section, HWP
Missouri Department of Natural Resources
1730 East Elm.
Jefferson City, MO 65101-4130

Dear Mr. Doster:

Enclosed is a copy of the subject final document, 2 CDs containing the document and responses to comments. Copies of this document are also being provided to Mr. Matthew Jefferson (U.S. Environmental Protection Agency), Mr. Eric Gilstrap (Missouri Department of Natural Resources), Ms. Karen Burke (Covidien) and Dr. Robin Rodriguez (Chamberlain Group Ltd.).

This Final document supersedes any prior version. Earlier versions should be destroyed. If you have any questions regarding this document, please contact Ms. Jo Anne Wade at (314) 260-3912 or josephine.a.wade@usace.army.mil.

Sincerely,

Sharon Cotner

Sharon R. Cotner
FUSRAP Program Manager

Enclosure

MDNR-MDHSS Comments on the SLDS Remedial Investigation and Baseline Risk Assessment, Draft Final, dated July 26, 2012

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
1.	General	The Department appreciates that the USACE changed the Remedial Action Objects to include suggestions made by the Department. The Department did provide other comments to the USACE on July 23, 2012, where changes based on those comments were not made to the draft final document and the USACE did not provide a response. The Department requests a response to the comments and any appropriate changes made to the draft final document. The following comments from our previous correspondence have not yet been resolved:	MDNR	See responses to comments below.
1a.		Typically, the nature and extent and the fate and transport of the contaminants in the Operable Unit would be fully developed, understood, and documented in a Remedial Investigation Report. The Department understands the USACE's need to complete some final characterization sampling prior to the Feasibility Study and can be flexible with that request. Therefore, the Department reiterates the statement that any additional surveying and/or characterization sampling (soil, radon, etc.) and associated risk analysis be completed prior to the finalization of the Feasibility Study if such surveying/sampling results or associated risk analysis has the potential to impact the remedy decision-making process. Please respond directly to how the USACE believes all relevant characterization has been	MDNR	There is no need for additional sampling of inaccessible soil, sewer sediment, soil adjacent to sewers, or building/structure surfaces. All site soil and sediment characterization necessary to perform risk assessment and development of remedial alternatives has been completed. Additional sampling will not impact the remedy decision-making process. However, samples collected from the inaccessible soils after June 15, 2011 will be incorporated into the FS as well as results from the ongoing radon monitoring.

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		completed.		
1b.		The Department reiterates that all sampling and surveying deviations from the Remedial Investigation Work Plan should have detailed evaluations and discussions in the report that include what samples/surveys were changed, the reason for the deviation, and any impact upon the characterization, risk assessment, or RI conclusion. This process is typically documented using field variance forms or other preapproved methods of modifying work plans. Having this information in the document will allow the reader to easily view the changes in order to assess any impact on the RI conclusion. At a minimum, the USACE should have a statement within the text on whether or not any deviations from the Work Plan have impacted the characterization or risk assessment.	MDNR	Section 2.2.1 states the following regarding inaccessible soil sampling deviations from the RI WP: *"If necessary, the proposed RI WP sample locations were moved a minimal distance to avoid utilities. Once the soil boring locations were determined to be clear of utilities, sampling activities began. In addition, modifications to the proposed sampling locations were necessary when auger refusal occurred prior to reaching the proposed sampling depth. Sampling locations where auger refusal occurred were relocated a minimal distance to ensure that relocation did not impact the intended sampling purpose."* Section 2.2.2 states the following regarding building/structural survey deviations from the RI WP: *"Building and structure surfaces that were surveyed included, but were not limited to, roofs, exposed exterior and interior surfaces, air vents, vertical and horizontal piping, and piping supports. The scoping surveys were biased, focusing on areas that are prone to accumulate contamination such as horizontal surfaces, depressions, cracked surfaces, rusted or unpainted surfaces, intake and exhaust vents, etc. While in the field, professional judgment also was used to select biased survey locations. ... Reasonable efforts were made to scan locations where safety considerations or other restrictions prevented access. These areas included those obstructed by overhead piping or utilities and those*

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
				areas/surfaces (i.e., roofs) that would not safely support access. These areas were minimal and did not jeopardize the objective of the scoping survey." Section 2.2.3.1 revised to state the following regarding sewer sediment sampling deviations from the RI WP: *"However, some field changes and/or additions to the proposed sampling locations originally identified in the RI WP were necessary based on information obtained during the field investigation. Some of the proposed manhole sampling locations were not sampled due to access problems (e.g., manhole cover or grate was covered or sealed closed), the lack of adequate volume of sediment required for analysis, or other site conditions (e.g., the presence of sanitary effluent). In these cases, the closest accessible manhole or surface drain was sampled to minimize any impact to the intended sampling purpose. The number of background sewer sediment sampling locations also was increased to provide a more statistically robust background dataset."* Regarding the sampling of additional background sewer sediment samples, Section 4.1.1 states *"A total of 11 background sediment samples were collected from manholes located in the industrial area located upstream (west) of the Mallinckrodt facility (Figure I-3-1). The RI WP identified 8 background sediment sample locations, but three manhole locations (SLD123754, SLD123755, and*

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
				SLD123756) located further upstream of the plant were also sampled to provide a more statistically robust background dataset." Section 2.2.3.2 states the following regarding RI WP deviations in soil sampling adjacent to sewer lines: *"Some modifications were made to the soil sampling approach outlined in the RI WP based on field conditions that would prevent effective sampling in the proposed locations (e.g., access constraints and the presence of utilities). The RI WP specified that a minimum of two soil samples would be collected from each boring at depth intervals of 0 to 2 ft and 2 to 4 ft beneath the base of the sewer line. Based on site conditions, three, rather than two, soil samples were collected from each boring to compensate for uncertainties concerning the depths of the sewer pipes. The additional soil sample was collected at an estimated depth interval from 2 ft above the base of the pipe to the base of the pipe. When the results of field screening indicated the presence of significant concentrations of radionuclides in the deepest sample, additional samples were collected from the underlying soil to bound the vertical extent of contamination."* Section 4.5, which summarizes the nature and extent of contamination and COPC identification, was revised to state the following: *"COPCs were conservatively identified based on a single exceedance of their risk-based PRG and are applied on a sitewide basis. These COPCs are*

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
				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. There is no need for additional sampling of inaccessible soil, sewer sediment, soil adjacent to sewers, or building/structure surfaces to define nature and extent of contamination. All site soil and sediment characterization necessary to perform risk assessment and development of remedial alternatives has been completed. Additional sampling will not impact the remedy decision-making process. The need for additional sampling for remedial design will be evaluated during the remedial design phase after RGs are developed for the COCs." A major deviation from the RI WP came about from changes from RI WP screening levels, which initially included ARARs and risk-based concentrations for the radiological and metal PCOCs, respectively, to more conservative, risk-based PRGs for all the screening of all PCOCs. This deviation, which came about as a result of EMCX and USEPA reviewer comments, resulted in all investigated areas and media in the ISOU being retained for the BRA. In other words, a more health-conservative risk assessment has been conducted than was intended by the RI WP. This

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
				has been indicated in the document via the following revision to the first sentence of the third paragraph of Section 4.1: *"Soil PRGs were obtained for the ISOU from the most recent USEPA databases available and are more health conservative than the screening levels initially proposed in the RI WP."*
1c.		The USACE states on page 65 that: *Although individual elevated measurement areas will be addressed in the FS, 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 the DT-4 South Storage Building. The other areas are either not beneath occupied or habitable buildings, or it will take more than 1,000 years for the Ra-226 to build up from the decay ofTh-230 to achieve significant levels.* The Five Year Review Report (2010) identified the need for radon monitoring at Plant 1 Building 25. Although the inaccessible soils sampling indicated that Building 25 at Plant 1 did not have	MDNR	Radon monitoring at Plant 1 Building 26 and DT-4 North South Storage Building is in progress and results will be available prior to finalization of FS. The last sentence of Section 5.2.1.2.1 was changed to *"Risk and dose due to Rn-222 exposure will be determined and presented in the FS."*

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		concentrations that currently exceed or will exceed the 40 CFR 192.12(a) values, two other areas (Plant 1 Building 26 and the South Storage Building at DT-4) did show concentrations exceeding those values, which warranted radon monitoring by the USACE. The Department believes these results are needed to understand the nature and extent of the contamination and to fully characterize the Operable Unit and request that this be completed within this Remedial Investigation Report. By any means, radon monitoring, sufficient to make a remedy decision and to determine future monitoring needs, must be completed prior to the finalization of the Feasibility Study. The Department also sees the need for the USACE to define how future potential risks to radon will be quantified and addressed where buildings or other structures may be built on areas where concentrations exceed (or in the future will exceed) the 40 CFR 192.12(a) levels but do not currently contain occupied or habitable buildings.		Options for monitoring, mitigation or other means of control for addressing future potential risks to radon intrusion from ISOU soils into renovated or newly constructed buildings, will be evaluated in the FS.
1d.		For comment #40 (page K-50 of the Read-Ahead document), the USACE stated: *While burrowing animals could be exposed to contaminants if they*	MDNR	1. USACE first identified inhalation as the significant pathway because it was thought that burrowing animals would not likely burrow under buildings and permanent structures, thereby rendering soil ingestion to being a

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		burrowed into the inaccessible soils area, the pathway that would likely be the biggest concern is inhalation, and VOCs have not been identified as PCOCs at the SLDS. ISOU Worms and insects would only be exposed to contaminants in the 0- to 1-ft interval. This is the top of the levee and essentially uncontaminated, so birds would not be at risk from consuming these invertebrates. The Department resubmits the preliminary comments provided informally to the USACE on June 5, 2012 that were not answered informally, in the response-to-comments or in the draft final read-ahead document. The questions are: 1. How did the USACE come to the conclusion that, "the pathway that would likely be the biggest concern is inhalation?" Although inhalation is one possible pathway for burrowing animals, ingestion of contaminated soils indicates that it would be an equally, if not more, significant pathway. Why did the		minor pathway relative to inhalation. However, given the different types of inaccessible soil, USACE recognizes that either soil ingestion or inhalation could pose the greater risk, and is dependent upon receptor- and contaminant-specific factors. More importantly, each of these pathways is expected to be of much lower concern than food ingestion. Given the limited number of receptors expected to have access to the inaccessible soils, USACE believes that soil ingestion and inhalation are insignificant pathways when considering effects at the population level. The first sentence of the cited paragraph has been revised as follows: *"While burrowing animals could be exposed to contaminants via ingestion and inhalation of soil if they burrowed into the inaccessible soils area, these exposures are expected to be insignificant due to the limited number of such animals expected to occur in the ISOU areas."* 2. USACE acknowledges that worm and insect exposures can occur below 1 foot but believes the majority of exposures would occur closer to the surface. Because most inaccessible soils are beneath consolidated ground cover (e.g., asphalt, concrete), birds would not be exposed to many prey items that had been exposed to the inaccessible soils. This leads USACE to believe that birds would not be at risk from consuming worms and insects at the site. The

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		USACE not evaluate this pathway? Additionally, why were VOCs the only concern for inhalation? Is inhalation of radiological PCOCs not also a concern? 2. Additionally, the USACE stated that, "worms and insects would only be exposed to contaminants in the 0- to 1-foot interval." Inaccessible soils have been found deeper than the 0-1 foot interval. According to the USDA (http://soils.usda.gov/sqi/concepts/soil biology/earthworms.html), earthworms can inhabit surface soils, upper surface soils and subsurface soils (that may extend several meters in the soil). Why, then, does the USACE state that earthworms can only be exposed at the 0-1 foot interval thus birds would not be at risk?		text has been modified as follows: *"Worms and insects would have limited exposure to the inaccessible soils which are typically beneath ground cover (e.g., buildings, asphalt). With limited exposure to prey items that had been exposed to inaccessible soils, birds would not be at risk from consuming these invertebrates."*
2.		The Department requests that the information contained in the USACE response to MDNR comment #5 regarding Plant 7W is included in the draft final document. An appropriate place to add this additional information is in the third bullet on page 6. Additionally, for the sixth bullet describing	MDNR	The following sentence added as the last sentence of the third bullet *"If historic sources of contamination are determined to be from MED/AEC activities inaccessible data will be added as an appendix to the current CERCLA document (i.e., 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."*

MDNR-MDHSS Comments on the SLDS Remedial Investigation and Baseline Risk Assessment, Draft Final, dated July 26, 2012

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		Plant 7N, please include a similar statement within the text on the process for including any inaccessible information into this report and subsequent documents.		The following sentence added as the last sentence of the sixth bullet *" If any inaccessible soil remains the inaccessible data will be added as an appendix to the current CERCLA document (i.e., 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."*
3.	Page K -25, Section K2.4.1 Radiological Toxicity Assessment first paragraph second sentence	Page K -25, Section K2.4.1 Radiological Toxicity Assessment first paragraph second sentence states, "Because radiological exposures result in cancer..." Merely being exposed to radiation will not result in cancer but may increase the risk of developing it. This statement needs to be rewritten to state, "Because radiological exposure may increase the risk of developing cancer..." or similar verbiage.	MDNR	The cited sentence has been revised to read: *"Because radiological exposures may result in cancer..."*
4.	Page 125, Section 7.4.1, Data Limitations, and Recommendations for Future Work.	There is no mention of radon sampling at Building 26 at Plant 1, or the Storage building at DT-4 (Gunther Salt). This information should be added to this paragraph along with a statement that radon sampling, sufficient to make a remedy decision and to determine future monitoring needs, will be completed prior to the finalization of the Feasibility Study.	MDNR	The following text has been added to Section 7.4.1 as the new penultimate sentence: *"Radon monitoring at Plant 1 Building 26 and DT-4 North South Storage Building is in progress and results will be available prior to finalization of FS. Risk and dose due to Rn-222 exposure will be determined and will also be presented in the FS."*
5.		MDHSS did provide preliminary comments to the USACE on July 23, 2012, where changes based on those comments were not made to	MDHSS	Responses to the MDHSS comments on the Read-Ahead Draft Final can be found in the Response to Comment Table for the Read-Ahead Draft Final

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
		the draft final document and the USACE did not provide a response. MDHSS requests a response to the follow up comments and any appropriate changes made to the draft final document.		Response to Comment Table.
6.	Section 5.2.2.2, Identification of Potential Receptors	Section 5.2.2.2, Identification of Potential Receptors, states that residential exposures are not likely to occur in the impacted area. However, to be consistent with the 1998 ROD, a residential risk assessment should be performed for the vicinity properties.	MDHSS	A hypothetical residential scenario has been added as Attachment K-1 to Appendix K of the Final RI/BRA. Data comparisons to USEPA risk-based residential PRG have been added as Attachment K-2 to Appendix K. However, future evaluations and decision making in the FS and Proposed Plan will be driven by the industrial land use scenarios. The residential scenario is provided as additional information that may or may not potentially assist in understanding the implications of the future land use assumptions and in assessing alternatives in the FS.
7.		MDHSS questions the use of the activity fraction presented in Table S-8, The St. Louis Downtown Site-Specific Activity Fractions. MDHSS commented on this issue on July 23, 2012. For many of the sites, thorium-230 and radium-226 were the dominant radionuclide present. MDHSS has yet to receive response to comment.	MDHSS	Please see calculations attached to this comment response table (Attachment 1 – Activity Fraction Comparisons). The calculations show that application of the sitewide activity fractions from the 1993 BRA results in the derivation of a more health-conservative DCGL for building surfaces than is obtained with using the updated ISOU sitewide EPC. Using sitewide data (i.e., the activity fractions developed from the 1993 BRA data) is appropriate as the soil found on building surfaces is windblown accessible soil from all of SLDS and not from inaccessible soil located beneath the structure.

MDNR-MDHSS Comments on the SLDS Remedial Investigation and Baseline Risk Assessment, Draft Final, dated July 26, 2012

Comment #	Page/Section /Paragraph	Comment	Reviewer	Response
8.	Appendix S. Referencing Table S-6, Individual Radionuclide Derived Concentration Guideline Levels Equivalent to 25 mrem/year and 1.0E-6 Risk - Industrial Worker	MDHSS would like to make note of a potential error in Appendix S. Referencing Table S-6, Individual Radionuclide Derived Concentration Guideline Levels Equivalent to 25 mrem/year and 1.0E-6 Risk - Industrial Worker, the risk-based DCGLs based on 1.0E-06 risk appear to be set to 1.0E-05. For example, when MDHSS performs the calculation, the actintum-227 DCGL of 37 dpm/100cm^2 set to 1.0E-06 comes out to 3.7 dpm/100cm^2 instead. If this is an error, then please correct accordingly.	MDHSS	The values listed in Table S-6, Individual Radionuclide Derived Concentration Guideline Levels Equivalent to 25 mrem/year and 1.0E-6 Risk - Industrial Worker, in Appendix S are correct. The risk-based DCGLs based on 1.0E-06 risk are set to 1.0E-06, not 1.0E-05. The Ac-227 DCGL set to 1.0E-06 risk is 37 dpm/100cm^2.

AR-018