



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

REPLY TO  
ATTENTION OF:

February 22, 2001

Formerly Utilized Sites Remedial Action Program

SUBJECT: Response to Missouri Department of Natural Resources Comments on the  
Regulatory Review Draft North County Feasibility Study and Proposed Plan, dated  
August 2000

Mr. Steve Mahfood, Director  
Missouri Department of Natural Resources  
P. O. Box 176  
Jefferson City, Missouri 65102

Dear Mr. Mahfood:

Please find enclosed the responses to Missouri Department of Natural Resources' comments transmitted to the U. S. Army Corps of Engineers on October 27, 2000, regarding the August 2000 Regulatory Review Draft North County Feasibility Study and Proposed Plan. These responses will be incorporated into the final version of these documents prior to release for public review and comment.

The Corps appreciates the time and consideration that you and your staff have dedicated to the preparation of these documents. If you have any further concerns regarding this matter, please contact me at (314) 260-3915.

Sincerely,

A handwritten signature in cursive script, reading "Sharon R. Cotner", is positioned above the typed name.

Sharon R. Cotner  
FUSRAP Program Manager

Enclosure

CC: Mr. Dan Wall, USEPA

**DRAFT COMMENTS BY MDNR AND RESPONSES FEASIBILITY STUDY AND  
PROPOSED PLAN FOR THE ST. LOUIS NORTH COUNTY SITE  
(August 2000 Regulatory Review Draft)**

**CRITICAL ISSUES**

**Cleanup Criteria**

1. DNR asserts "Proposed RG for Unrestricted Use" values for chemicals should be based upon a 10<sup>-6</sup> risk range. The values provided within the F.S. are considerably higher than the draft issued in December 1999 and the values used at other sites.

**Response:** Concur in part. The RGs were developed consistent with the CERCLA process by establishing PRGs at the Point of Departure corresponding to a 10<sup>-6</sup> risk based on reasonable maximum exposures. The RGs were moved off the point of departure based on CERCLA guidance. The RGs for carcinogenic chemicals result in a residual site that is fully protective within the CERCLA risk range for all land uses and risk scenarios. Notably, the RGs for most non-radiological contaminants of concern are based on the non-carcinogenic risks and thus are based on Hazard Index. In most cases, RG values for the construction worker scenario were selected, as it was the most restrictive scenario (the exceptions were chromium and thallium in surface soil, where the residential value was the most restrictive). The earlier values (12/99) were very preliminary values included in a working draft of the FS. These December 1999 values were generally derived based on non-carcinogenic risk and a Hazard Index of 0.1 for 8 of 11 non-radiological COCs. The remaining 3 of 11 were set at an HI of near 1. The revised list is based on a target organ analysis that limits the combined HI to less than or equal to 1 for the metals that affect the same primary organ. Revised RGs that incorporate this target organ analysis are currently being coordinated internally within USACE.

2. We disagree with raising the surface criteria concentration for Th-230 from 5pCi/g to 14pCi/g. Our reasons are listed below:
  - a. The impact will be a reduction in surface remediated of approximately 20 acres
  - b. The modification conflicts with the St. Louis Task Force Resolution
  - c. The modification conflicts with US EPA directives
  - d. USACE has not provided a risk assessment demonstrating the impact of the modification.

**Response:** Do not concur. The surface soil standard for Th-230 is based on and fully compliant with ARARs and is specifically stated in federal guidance. The Th-230 concentration that equates to 5 pCi/g of Ra-226 is 670 pCi/g for the residential scenario. The development of a risk-based RG for Th-230 consistent with CERCLA would result in a residential RG of up to 720 pCi/g. The value of 14 pCi/g is derived directly from the UMTRCA surface soil standard of 5 pCi/g of Ra-226 as 14 pCi/g results in the in-growth of 5 pCi/g of Ra-226 over a period of 1000 years. As this value is more restrictive, it is adopted as the limiting case. In accordance with the NCP, the selection of remediation criteria is not based upon achieving or necessitating the remediation of some predetermined amount of acreage. It is based upon analysis of ARARs and/or assessment of risk - as explained earlier in this paragraph. In addition, the St. Louis Site Remediation Task Force recommended removal of the North County Site soils to unrestricted use standards. The value of 14 pCi/g is consistent with St. Louis Task Force recommendations in that it represents an unrestricted release standard for surface soils. Protectiveness of the 14 pCi/g Th-230 standard is well documented in the FS/PP. The remediation goal in surface soils complies with USEPA directives as noted in April 2000 Directive No. 9200.4-6(6) which states: "If the majority of radiological risk is posed by contaminants of concern at a site in

*the soil and structures that are the same (i.e., radium-226, radium-228, thorium-230, thorium-232, uranium-234, and/or uranium-238) as those existing at NRC thorium mills and uranium recovery facilities, then the Criterion 6(6) rule's benchmark dose limit is a potentially relevant and appropriate requirement for those contaminants (i.e., radium-226, radium-228, thorium-230, thorium-232, uranium-234, and/or uranium-238) found in soil and/or structures at the site."*

3. Several descriptions of selected Alternative 5 are put forth in the Proposed Plan. Text on pages 22 and 25 describes use of institutional controls for soils under roads, railroads, and bridges with cleanups performed to supplemental standards (using the 100 mrem/yr criteria for public exposure). However, text on page 24 states "while the preferred alternative is to excavate under roads, bridges, and railroads to the supplemental limit such that the dose is less than the 100 mrem/yr limit for members of the general public, the option to use institutional controls at all roads, bridges, and railroad locations is included." The first describes institutional controls and supplemental standards as a single action while the latter implies they are independent alternatives. Assuming the first is USACE's intent, MDNR recommends the following modification to the quoted passage: *Institutional controls shall be maintained on all properties not remediated to free release criteria (roads, bridges, & railroads) due to accessibility. However, a supplemental standard (using a 100 mrem/yr criteria for public exposure) shall be used to determine if such properties should be made accessible for remedial action under the FUSRAP project.*

**Response:** Concur in part. Text will be revised as follows: *"Institutional controls shall be maintained on properties not remediated to unrestricted release criteria (roads, bridges, railroads, and buildings)".* The cleanup criteria for roads, bridges, and railroads are protective in that they are both within the target risk range and below dose-based limits as long as institutional controls are maintained. The requirement ensuring that doses would still be below 100 mrem/yr if controls were lost, provides an additional level of protection. The FS includes text to allow the USACE to use institutional controls if, for example, access permits could not be obtained.

4. MDNR builds upon the previous comment by stating, *should the determination be made that soils under a portion of a road, bridge, or railroad must be remediated because it exceeds supplemental standards, the removal action for that portion of the property should be performed to unrestricted use criteria. The same will be true for portions of these properties that have concentrations below supplemental standards, but have become accessible through activities such as infrastructure construction or repair.* This will eliminate potential risks and expense of having to "re-remediate" portions of property, as they become accessible. Please consider inclusion of such a statement within the Proposed Plan.

**Response:** The determination that soils under a portion of a road, bridge, or railroad require remediation will be based on it exceeding the 100 mrem/yr standard. Remedial action for these portions of the properties will be performed to achieve unrestricted use criteria within the lateral extent (boundary) originally requiring excavation to achieve the 100 mrem/yr standard (i.e. the Corps will excavate vertically, but will not chase contamination laterally). Each situation will be individually evaluated. The Proposed Plan will be clarified regarding this issue. North County properties released with residual concentrations of radionuclides exceeding ROD criteria will be remediated where made available.

## Groundwater Contamination

1. The Proposed Plan states, on page 11, "there are no FUSRAP related COC's in groundwater." USACE groundwater monitoring data identifies FUSRAP COC's do exist with concentrations directly under the site in magnitudes of order greater than in surrounding wells. MDNR recommends:
  - a. The Feasibility Study and Proposed Plan recognize FUSRAP related COC's in groundwater.
  - b. USACE should use information such as potential yield and groundwater usage in stating their opinion on the appropriateness of remediation or monitoring.

**Response:** a. The sentence, "*An assessment of ground water concluded that there are no FUSRAP-related COCs in ground water,*" is technically accurate by the definition of "COCs," but may be misleading to some people. USACE responds by incorporating the following revision for p. 11 of the PP: "*An assessment of ground water concluded that there are no COCs in the HZ-E ground water, the protected water resource. Although some soil contaminants have entered the shallow HZ-A ground water, their presence does not require action. The HZ-A ground water has no defined COCs because a complete pathway to receptors does not exist. Therefore the chemicals do not meet the definition of COC.*"

b. The following statements will be added to p. 12 of the PP in the discussion of Remedial Action Objectives (RAOs). "*There are no goals for HZ-A ground-water improvement. The pathways and risks are such that the HZ-A ground water does not require remediation. COC removal from soil will lessen any potential impact upon HZ-A ground water.*"

2. MDNR does not agree that no long term monitoring is needed beyond remediation activities. MDNR recommends that monitoring of groundwater continue at a minimum in order to:
  - Verify the removal action's protectiveness (i.e. Excavation of the soil is beneficial as a source removal rather than to act as a mobilizer);
  - Verify that there is no communication between the upper and lower hydrostratigraphic zones (HZ-A and HZ-B respectively).

**Response:** Concur in part. Monitoring would continue to evaluate the effectiveness of the remedy and to ensure that degradation of the ground water is not occurring as a result of the remedial action. These monitoring results will be reviewed as a possible component of 5-year reviews and monitoring will be discontinued when no longer necessary. The following paragraph has been added to the end of Section 2.2.5.2 of the FS.

*In summary, the following data supports the determination that unacceptable levels of contamination will not migrate to HZ-E due to the limited connection between the shallow and deep ground-water systems.*

- *Lithologic data: A highly impermeable clay aquitard (Unit 3M) separates the upper ground-water system from the underlying ground-water zones. The geometric mean vertical hydraulic conductivity of the Unit 3M aquitard, based on laboratory tests, is  $5.5 \times 10^{-8}$  cm/s (BNI, 1994). The underlying silty clay layer Unit 3B (geometric mean vertical hydraulic conductivity of  $3.1 \times 10^{-7}$  cm/s) provides an additional barrier to vertical contaminant migration. Most chemical species will sorb to some extent to the clay particles.*
- *Potentiometric data: A comparison of the ground-water elevation measurements from shallow and deep monitoring well pairs indicates they exhibit different hydraulic heads. This demonstrates that the shallow and deep zones are distinct and independent ground-water systems with limited hydraulic connection.*
- *Chemical analysis of the major, naturally-occurring cations and anions in ground water: The different ground-water chemistry of the shallow and deep ground-water systems indicates minimal*

*mixing occurs. The lower tritium concentrations observed in the deep ground-water also supports the determination that little downward migration occurs from the upper zone.*

- *Ground-water modeling results indicate the peak contaminant concentrations reaching HZ-E are well below risk levels (BNI, 1996). The rate of vertical contaminant movement suggests times exceeding 1,000 years to reach the Limestone Aquifer. This arrival period assumes continued soils contamination. There are several reasons to suggest that the arrival periods for contaminants to reach HZ-E are longer than 1,000 years. Soil source-term removal would lengthen the arrival period and would reduce the concentrations reaching HZ-E.*

The following text has been added to the description of Alternative 5 in Section 4.2.5 of the FS:

*"Long-term monitoring is not required for HZ-E. Long-term monitoring for Unit 2 of HZ-A may be required. Short-term monitoring of HZ-A ground water after removal/remedial actions and base flow contamination of Coldwater Creek will resolve whether long-term monitoring of HZ-A is warranted."* An appropriate approach for monitoring based on the uranium concentration in Coldwater Creek will be assessed and groundwater monitoring implemented as appropriate. The extent of contamination remaining under roads, bridges, and rail properties will be developed at a later date.

3. The remedial action objective does not include groundwater as a media. (See page ES-25 of FS).

**Response:** It is not appropriate to address ground water as a primary medium. There are no COCs in HZ-E because FUSRAP materials have not impacted HZ-E. There are no COCs in HZ-A because there are no complete pathways and therefore there is not a risk to potential receptors. Nevertheless, while it is not appropriate to address ground water as a primary medium, the proposed removal of a potential source of contamination will have a coincidental beneficial effect. The fourth RAO has been modified as follows: "Eliminate or minimize the potential migration of contaminants off site, including the potential for migration to ground water and surface water, by removing the sediment and soil sources."

### **Institutional Controls**

1. The proposed acceptable risk level is  $1 \times 10^{-4}$ . DNR asserts that an appropriate risk level for unrestricted use is  $1 \times 10^{-6}$ . Although DNR does not recommend a lower criteria for radiological contaminants, if the proposed risk level is accepted, it should not be represented as free release.

**Response:** Do not concur. There are several reasons for this position. First, FUSRAP is being conducted in accordance with the National Contingency Plan (NCP), which specifies an acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The proposed acceptable risk level is within this range. According to EPA guidance, if risks are within the NCP risk range, no controls are required. Secondly, standards for release without radiological restrictions are well established by both EPA and NRC and have been upheld in legal challenges. NRC developed standards at 10 CFR 20, Subpart E, and 10 CFR 40, Appendix A, pursuant to the Atomic Energy Act. EPA established standards for unrestricted use. In the case of American Mining Congress v. Thomas, 772 F 2d 640 (10<sup>th</sup> Cir. 1985), EPA successfully argued that the final (UMTRCA) radium cleanup standard for soil allows unrestricted use of the land. Finally, the variation of naturally occurring radionuclides within Missouri is over 4 pCi/g (Tidball, 1984). The risk from mean background values for Missouri is  $1.8 \times 10^{-4}$ . The risk in Missouri from soils with elevated natural background concentrations exceeds  $3 \times 10^{-4}$  in some locations. As such the adoption of a  $10^{-6}$  risk level for radionuclides by MDNR would require control of naturally occurring soils within the State of Missouri. Adoption and strict implementation of a  $10^{-6}$  risk level would also

necessitate that MDNR control all residue from water treatment and public owned treatment works within the State due to the presence of the same radionuclides in the natural environment that are present in FUSRAP soils. This would not be practicable.

2. Using the varying cleanup levels in the upper 6 inches versus subsequent layers, there is no mention of how the 6-inch cover would be maintained. DNR recommends there be monitoring and/or notification to current and future property owners.

**Response:** Do not concur. It is assumed that this comment addresses areas remediated to unrestricted release criteria. Cleanup in these areas will meet the ARAR-based unrestricted criteria. Thus, no further actions are required. There is no requirement for a 6-inch cover, monitoring or other actions. Remediation to date indicates that subsurface soils remediated to the proposed criteria will meet surface criteria such that no controls are appropriate. Residual site conditions will continue to be fully documented in Post Remedial Action Reports.

3. It is proposed that monitoring will be performed only until remediation activities are complete. However, DNR asserts that monitoring should be continued to provide values for 5-year assessments in order to determine the protectiveness of the remedy.

**Response:** Concur in part. Monitoring will be performed until authorized to be discontinued or modified pursuant to the 5-year reviews. For those areas where contaminants are present at levels that allow for unlimited use and unrestricted exposure, short-term ground-water monitoring is proposed to assure the effectiveness of the source removal and to verify that no significant migration of contamination to useable ground water is occurring. Ground-water monitoring would follow the methodology outlined in the technical working group meetings (meetings held in December 1999 and November 2000) and the Environmental Monitoring Implementation for the St. Louis Sites.

4. Additional controls must be put in place for the monitoring of Radon emissions.

**Response:** Concur. As stated in Appendix D of the FS, radon monitoring will be conducted as necessary in appropriate Futura buildings to assure that radon concentrations comply with applicable standards (40 CFR 192.12(b)). These standards state that "*in any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL...*"

#### **Use of St. Louis FUSRAP Soil as Backfill**

1. Text within the Proposed Plan, page 17, reads "Soils above cleanup criteria would not be used as backfill." MDNR prefers this passage to be modified to reflect practices currently performed at the North County properties. They are described below:
  - 1) Soils from St. Louis FUSRAP properties will be used as **permanent** construction backfill only if they have contaminant concentrations at background values or less. Even then, they should only be used on properties that are part of the St. Louis FUSRAP project.
  - 2) Soils from the St. Louis FUSRAP properties having contaminant concentrations between background and cleanup criteria can be used as **temporary** construction fill. However, they shall only be used on St. Louis FUSRAP properties with removal to be performed within the scope of the FUSRAP project.

**Response:** Concur in part. Site soils such as overburden over lenses of contamination can be used as backfill if they are unimpacted or if they meet the cleanup criteria for surface soils. Soils with concentrations complying with the stated ARARs are protective for any future anticipated land use and require no controls. Use of FUSRAP soils at non-FUSRAP sites will not be pursued.

2. Addressing the above comment will also resolve MDNR's concerns regarding USACE's Beneficial Use Alternatives list provided in the Feasibility Study. The list includes the option of using FUSRAP material as construction fill for the St. Louis Airport expansion. While such a practice is not specifically described within Preferred Alternative 5, we could not find anywhere within the FS or PP where it is excluded. MDNR **will not** support the use of St. Louis FUSRAP soils as construction fill on projects unrelated to the St. Louis FUSRAP sites.

**Response:** Concur. USACE will not pursue relocation or beneficial reuse of FUSRAP soil at non-FUSRAP sites.

## **GENERAL COMMENTS**

### **Site History**

1. Page 4 PP:
  - In other sections of the report mention is made of the "sands from Hiroshima and Nagasaki." Similar mention is needed in this section.

**Response:** This phrase could not be found in our word search; please clarify where this text occurs.

2. Figure 5 of the Proposed Plan depicts portions of "North Ditch" as being remediated that have not yet been addressed. This is specifically sections A through I of the ditch, as depicted on the plans prepared by Radian, and the previously existing sedimentation trap. The latter also contains temporary construction fill consisting of soils removed from Vicinity Property 38. Please revise Figure 5 and similar documentation within the Feasibility Study to show removal actions are still planned for these areas.

**Response:** Concur. The figure will be updated to show recently excavated areas and to clearly indicate what areas are not fully remediated.

### **Costs**

1. Appendix C FS:
  - With only a 30% increase in cost between alternative 6 (clean up everywhere) vs. alternative 5 (clean up everywhere except for roads, bridges, and railroads), there should be a total cost/benefit analysis before alternative 6 is completely disregarded.

**Response:** Do not concur. The selection of Alternative 5 rather than Alternative 6 is not simply an issue of cost. It is also based on the determination that soils under roads, bridges, railroads, and buildings do not currently present a risk and that the removal of soil under the roads, bridges, railroads, and buildings would increase short term risks (such as the potential for accidents.) Coordination with the St. Louis County indicates that there is objection to remediation under roads and bridges.

## Health Risk and Dose Assessment

### 1. Page 9 PP

- Summary of Site Risks, notes that a supplemental risk assessment was performed and included in the FS "...because...portions of the site have been or are being cleaned up, ..." MDNR objects to using this data as part of the Baseline Risk Assessment.

Conceivably, the recent and planned cleanup would only address highly contaminated areas and lower the overall risk, which would not reflect the nearly 50 years of exposure and off-site release of materials. Is this how the Corps applied the supplemental data?

**Response:** Data from the remediated areas were not used in the risk assessments. The supplemental risk assessment uses the data from the baseline characterization and does include the risk that was previously possible from areas that have been remediated. Where soils have been disturbed (i.e. SLAPS down to 5 ft), data from some of the deeper soils were included in the surface soil scenarios so as not to underestimate the potential for exposures.

### 2. Page 10 PP

- The first paragraph describes the construction worker scenario as best representing the current conditions. However, the scenario only assumes the worker to be at the site for one year. Removal operations have taken longer than one year. Since cleanup of this site has been in progress for several years and with several years to come, the scenario needs to be revised to reflect the time.

**Response:** Do not concur. The construction scenario depicts the dose and risk to a construction worker working at the site after remediation of the property is complete. The scenario is not meant to represent the remediation worker. The construction worker scenario and five other scenarios were used for the risk analysis to reflect a range of different conditions.

### 3. Page 11 PP

- **Ecological Risk**, as stated the process only used a screening technique and did not provide a characterization assessment. MDNR cannot concur with the conclusions reached and does not rule out future environmental injury assessments. MDNR's director is the Natural Resources Trustee for the state and as such has authority to determine impact for the contamination.

**Response:** The screening-level ecological risk assessment conducted for the North County Site followed EPA guidance for the ecological risk assessment process. A decision that additional assessment was not required was based on the low risk relative to uncertainty in risk estimates, low probability of significant ecological effect on local populations, and the lack of unique, rare and critical habitat at the site.

### 4. Page 13 PP

- The last sentence of the first paragraph on the right hand side makes an inappropriate and unfounded conclusion. Cleanup to  $10(-6)$  should be attempted, while recognizing background levels (i.e. Cleanup goals would be X plus background).

**Response:** Concur in part. Concur that the  $1 \times 10^{-6}$  risk level corresponds to the point of departure and is the initial cleanup goal for all EPA sites. However,  $1 \times 10^{-6}$  may not be achievable for a particular contaminant or site, or if there are multiple contaminants at the site. Movement away from the point of



departure is appropriate based on consideration of the CERCLA criteria, e.g. protectiveness and implementability. The acceptable level of risk under CERCLA is between about  $10^{-6}$  to  $10^{-4}$ . A remedial alternative is protective if the total risk from exposure to all contaminants is within the CERCLA target risk range and the total hazard is less than 1. Background concentrations of radionuclides produce risks exceeding  $10^{-6}$ . In addition, there are limits to the ability to detect these contaminants in the environment. Therefore movement away from  $10^{-6}$  is justified by the NCP in Title 40 Code of Federal Regulations (CFR) 300.430(e)(2). In addition, the cleanup criteria which are based on ARARs are protective under CERCLA. The statement "*Given that movement away from the point of departure is justified, evaluations determined what concentrations were appropriate*" will be deleted and revised to read "*The development of site-specific remedial goals is described below.*"

5. Page 18 PP

- Containment, 3 feet of clean soil would need to be low permeable material ( $10^{-7}$ ) in order to meet radon barrier requirements.

**Response:** Concur in part. The cover would achieve the radon barrier requirements of 10 CFR 40 and 40 CFR 192 without the use of a 3 ft thick layer of low permeability clay. Rough calculations show that the use of the soil barrier alone is expected to reduce the radon emanation to less than half of the acceptable standard.

6. Page 18, Alternative 2

- The requirements for the cap have to address radon barrier and should include water infiltration barrier. This would require at least 3 feet of impermeable soil (clay) and possibly a synthetic layer.

**Response:** Please see response to previous comment (comment 5).

7. Page 29 PP, Table 2

- The second objective should have a statement to the effect that the cleanup of the soils and sediments are also being performed to assure protection to groundwater and surface water.

**Response:** The fourth RAO will be revised as follows: *"Eliminate or minimize the potential migration of contaminants off-site, including the potential for migration to ground water and surface water, by removing the sediment and soil sources."*

8. Alternative 5, PP, Cleanup Levels

- The PP needs more detail as to what the limiting dose will be for working under roads and railroads. Also, more specifics as what the scenario is being used is. For example, is it construction worker at 2000 hours on-site per year, or the utility worker for 80 hours on-site per year.

**Response:** Concur in part. The 100-mrem/yr dose limit is derived from 10 CFR 20.1403. For roads, bridges, and railroads, the limit considers both the utility and a modified construction worker (which is representative of actual conditions) should the institutional control be lost. This basis is described in section D.2.2.3. The basis will be added to the description of Alternative 5.

9. FS, Appendix D, pg. D-12

- FS uses an External Gamma Shielding Factor of 0.4 (60% reduction in external dose for someone inside the home) whereas the default value of RESRAD is 0.7 (30% reduction). An explanation as to why 0.4 is used instead of the default value because a dose increase from 19 mrem/yr (0.4 shielding factor) to 33 mrem/yr (0.7 shielding factor).

**Response:** The shielding factor was taken from the risk assessment performed by EPA to reassess dose and risk associated with the UMTRCA remediation criteria ("Reassessment of Radium and Thorium Soil Concentrations and Annual Dose Rates", EPA, July 22, 1996). A footnote has been added referencing this EPA document.

## Ground-water Contamination

1. Page 11 PP

- MDNR disagrees with the statements regarding TCE in the **Ground Water** paragraph. It has been documented that barrels and other materials brought to the site were cleaned with the TCE solvent. At a minimum, TCE should be included as a COC with monitoring.

**Response:** Do not concur. The following statement will be added to the FS: *"TCE will be monitored and soils containing TCE commingled with radionuclides will be remediated. Excavation waters contaminated with TCE or its degradation products will not be released off-site above appropriate levels."* Nonetheless, TCE was not included as a COC for SLAPS because the distribution pattern at the site and lack of significant concentrations of degradation products are not consistent with FUSRAP origin. As the Corps is unaware of documentation citing the use of TCE at any North County location,

please provide copies of any relevant documents concerning the use of TCE to clean "barrels and other materials brought to the site."

2. Page 18 PP

- Groundwater monitoring whether under Alternative 2 or others will be required. During the first five years, the monitoring will be at a minimum twice annually in order to assess protectiveness of the remedy.

**Response:** Concur in part. Five-year reviews are appropriate where remedial actions specified in the ROD allow hazardous substances, pollutants, or contaminants to remain in place above levels that allow for unlimited use or unrestricted exposure. Therefore, only those areas with contamination present above these levels are potentially subject to long-term ground-water monitoring. The frequency of monitoring would be determined following the methodology outlined in the technical working group meetings (meetings held in December 1999 and November 2000) and the Environmental Monitoring Implementation Plan for the St. Louis Sites. Thus, monitoring frequency may be more or less stringent than "twice annually."

3. Page 19, Alternative 4

- DNR will require groundwater monitoring in the five-year reviews in order to evaluate remedy protectiveness. A detailed description of what the institutional controls are, how they are implemented and enforced and other engineering control requirements is needed.

**Response:** Concur. Five-year reviews and monitoring of ground water are included as part of this alternative. Additional text will be added to clarify institutional controls (ICs) for this alternative.

## Cleanup Criteria

1. Page 12 PP

- The fourth paragraph on the right side describes supplemental standards. How are these developed and applied?

**Response:** 40 CFR 192 identifies situations under which supplemental standards (levels greater than the unrestricted general standards) may be developed. It does not specify how these standards are to be developed. For the two situations (roads, bridges and railroads, and subsurface soils with institutional controls) supplemental standards were developed using site specific risk scenarios and moving off the point of departure based on CERCLA criteria. These concentrations were also limited to assure that doses not exceed the 100 mrem/yr standard defined in 10 CFR 20.1403 for the situation where institutional controls are lost. The concentration limits are 36, 100 and 640 pCi/g for Ra-226, Th-230, and U-238 pCi/g, respectively, for roads, bridges and railroads. For subsurface soils with institutional controls the corresponding limits are 25, 70 and 250 pCi/g.

2. Page 13 PP, **Derivation of remediation goals and cleanup levels**

- The reference made to 10 CFR 40, Appendix A, Criterion 6(6) has been ruled inappropriate by EPA. MDNR also disagrees with the NRC application to the FUSRAP sites.

**Response:** Do not concur. The latest (April 2000) EPA guidance identifies the use of Criterion 6(6) as appropriate for mill tailing constituents. This guidance (OSWER Directive no. 9200.4-35P) specifically states "*If the majority of radiological risk is posed by contaminants of concern at a site in the soil and structures that are the same (i.e., radium-226, radium-228, thorium-230, thorium-232,*

uranium-234, and/or uranium-238) as those existing at NRC thorium mills and uranium recovery facilities, then the Criterion 6(6) rule's benchmark dose limit is a potentially relevant and appropriate requirement for those contaminants (i.e., radium-226, radium-228, thorium-230, thorium-232, uranium-234, and/or uranium-238) found in soil and/or structures at the site."

3. Page 14 PP

- The last sentence in the first paragraph on the left hand side is not applicable, see comment 10.

**Response:** Do not concur. The latest (April 2000) EPA guidance identifies the use of Criterion 6(6) as appropriate for mill tailing constituents. We conclude that this sentence is correct. We do not understand the reference to comment 10.

Page 19 PP, "Treatment"

- Would the plants be harvested? If so, how would the plant be disposed of, recognizing that the material would be radioactive and possibly hazardous (heavy metal contamination).

**Response:** Plants would be harvested and shipped offsite for disposal in an approved facility. This will be added to page 19 of the PP.

4. Page 25 PP

- DNR is unaware of any substantial characterization sampling performed under roads, bridges or railroad right-of-ways. How will areas be identified that fall outside of the proposed supplemental standards for these areas? Also, see comment # 3 under Institutional Controls.

**Response:** Some sampling has been conducted under roads, bridges, and railroads. (See the attached data summary for existing information on soil concentration under roads.) The standards would apply only to those areas immediately under roads, bridges, and railroads. Final status surveys will confirm that these areas comply with the supplemental standards. Conditions that exist under roads, bridges and railroads will be clearly defined to allow unrestricted release of areas that comply with unrestricted soil RGs.

5. Coldwater Creek Cleanup Criteria

- How is the mean water line defined?

**Response:** The "mean water line" was an abbreviated phrase for the water-surface profile based upon mean daily flow. The water-surface profile or "mean water line" is an elevation for the mean daily flow based upon the hydraulic gradient assessed along reaches of Coldwater Creek. The term "mean water line" in the FS and PP will be changed to "*mean water gradient*." A sentence will be added to the FS in section 5.2.5 and in the PP in the paragraph for Coldwater Creek on page 25: "*The mean water gradient is water-surface profile based upon the mean daily flow of Coldwater Creek at assessed reaches.*" A map of the mean water gradient will be placed in the Administrative Record and provided to the state. The map will include the creek section from Banshee Road to Pershall Road. The mean water gradient will be defined for any other reaches thereafter when future sediments of Coldwater Creek have been found to exceed the sediment criteria of Table 3 in the PP.

6. What are the ALARA goals and under what kind of circumstance would they be applied?

**Response:** An ALARA assessment is implemented in lieu of formal ALARA goals. Pursuant to EPA instruction, the use of "ALARA" analysis has been minimized in the document. An ALARA assessment consistent with 10 CFR 40, Appendix A, Criterion 6 (6), will be developed and included in

the Administrative Record. This analysis will assess the need for separate ALARA goals and the circumstances under which they would apply. This assessment compares the cost and risk benefits. These analyses generally conclude that the FUSRAP RGs are fully compliant with the ALARA requirements.

8. Page 2-57 FS

- On this page it states "most of the metals appear to be confined to surface soils." What documentation/data is available that supports this observation?

**Response:** The data is provided in the SLAPS Implementation Report as well as in attachments to Appendix D in Volume 2 of the FS.

8. Page 31, PP, Table 4

- Uranium is listed as a metal at the PRG level of 640 mg/kg. This level is higher than the radionuclide cleanup level of 50 pCi/g that converts to 75 mg/kg. Why was uranium included in the chart this way? We recommend it either be omitted or the radionuclide level be used and noted.

**Response:** Although separate values are derived for uranium for carcinogenic risk and non-carcinogenic toxicity, the RG is selected as the lower of these values. As such, the U-238 value of 50 pCi/g has been established as the RG.

9. pg. ES-7, RS, 1<sup>st</sup> paragraph

- It is stated, "The characterization data indicate that non-radiological contaminants related to uranium manufacturing and processing at SLDS are present. However, these chemicals would be addressed by remediating the radionuclides at the North County Site because the FUSRAP-related chemicals are generally co-located with the radionuclides." It is not clear in the PP if there will be sampling for all chemicals and radionuclides for final verification of the remedy.

**Response:** As a clarification, non-radiological COCs will be addressed in a final status survey plan.

10. TCE, Region IX Screening

- Since the background concentration for TCE is 0.0 mg/kg, then this should be carried forward. However, in the FS TCE is not carried forward, instead it is screened against the Region IX levels and it drops out. Using RAGS, this chemical should be carried forward and considered as a PCOC. However, it gets screened against the Region IX Industrial levels (6.1 mg/kg) and it subsequently gets screened out.

**Response:** Do not concur. There are three data screens consisting of background screen, PRG screen and a weight-of-evidence screen, any of which could eliminate a chemical from future consideration. TCE is appropriately screened out by this process, which is consistent with RAGs.

11. FS, Table 2-1, mention of old oil dump

- It states that the oil dump was located in area of the larger AM-10 (Figure 2-8). On Figure 2-9, it can be seen that this area corresponds to IA-3. IA-3 is bounded by IA-1, IA-2, IA-5, and IA-12. The following details where detects of TCE were located and the corresponding concentration found in the area.
  - Attachment 6- surface soils, (page 7 of 14), IA-3, 1 of 3 detects; with 0.005 mg/kg.
  - Attachment 6- surface soils, (page 14 of 14), SLAPS, 1 of 11 detects, with 0.005 mg/kg.
  - Attachment 7- subsurface soils, (page 2 of 13), IA-1, 1 of 2 detects, with 0.0066 mg/kg.

- Attachment 7- subsurface soils, (page 3 of 13), IA-2, 2 of 6 detects, with max of 0.058 mg/kg.
- Attachment 7- subsurface soils, (page 5 of 13), IA-3, 6 of 11 detects, with max of 0.054 mg/kg.
- Attachment 7- subsurface soils, (page 10 of 13), IA-9, 3 of 40 detects, with max of 0.006 mg/kg.
- Attachment 7- subsurface soils, (page 12 of 13), SLAPS, 9 of 44 detects, with max of 0.058 mg/kg.
- Attachment 8 (page 4 of 5) shows the shallow groundwater of SLAPS with TCE concentrations detected in 24 of 85 samples with a maximum detect of 0.97 mg/L. The same Attachment 8 lists the HISS shallow groundwater (page 2 of 5) with TCE concentrations found in 7 of 41 samples with a maximum detect of 1.3 mg/L. It is unclear in the FS why there are no soil samples for TCE in the HISS area.
- It should be noted that the three highest concentrations of TCE were found in IA-2, IA-3 and the general area of SLAPS. This area corresponds to the area of the old oil dump. The groundwater samples in this area also show TCE contamination. Please explain how it is that TCE is "not FUSRAP-related"?

**Response:** Non-FUSRAP related TCE contamination exists in soils and ground water outside of SLAPS boundaries. FUSRAP soils containing TCE commingled with radionuclides will be remediated. In addition, the remedial design will fully consider TCE and its degradation products to assure that off-site releases comply with appropriate requirements. No excavation waters contaminated with TCE or its degradation products will be released above appropriate levels. The existence of the alleged "old oil dump" is based on one historical diagram and has not been confirmed by any other documents. The dump could not be discerned in aerial photographs from that time period. No soil samples have been analyzed for TCE at HISS. This conclusion is based on lack of evidence correlating TCE to FUSRAP activities at HISS and on the contaminant distribution in ground water, which indicates that the only detections of TCE above MCLs in HISS ground water are from wells located immediately down gradient of Futura (wells HISS-17S and HISS-9). The maximum TCE concentrations detected in the soil samples are 2 to 3 orders of magnitude below screening levels (Region IX surface and subsurface soil PRGs) and so are below  $10^{-6}$  risk levels. Although TCE does not pose a risk to human health or the environment, the USACE will continue to monitor the ground water for TCE.

12. FS, Page 2-1

- Lead is listed as a component of the uranium ore processing, but since tox data is unavailable or qualitative, it is screened out. However, soil samples at IA-3 has a maximum level of 1200 mg/kg. This is much higher than the Region IX PRG level of 40 mg/kg. The screening level for lead from the state of Missouri is 660 mg/kg for industrial use. Even though the lead is commingled with the radionuclides and should be cleaned up subsequently, will there be any verification sampling for lead when the remediation is complete?

**Response:** Lead was a trace constituent of the ore and has a mobility comparable with uranium, so it is expected that remediation of U-238 to 50 pCi/g would protectively address lead. This conclusion was supported by the results of the lead sample analyses taken after the radium pits removals. Radium pits results indicate lead concentrations of 8 to 10.4 mg/kg remained after the removal was complete. Therefore, verification sampling for lead will not be done.

### ARARs

1. Page 9 PP, Scope and Role

- What is the significance of January 1, 1998 for ARAR's?

**Response:** This is the date MARSSIM became effective. Text will be revised to indicate that DOE remediated the properties to protective levels using their verification protocol that existed prior to MARSSIM.

2. Page 12 PP, ARAR's.

- MDNR provided it's list of ARAR's to the Corps in the Fall of 1998. We were required to describe in detail why or how the law or regulation was applicable, relevant or appropriate. In similar fashion, the Corps is required to respond in detail why the offered law or regulation would not be considered an ARAR. To date, this information has not been provided. We request that evaluation.

**Response:** Concur. USACE provided the rationale for acceptance or rejection of MDNR's proposed ARARs as part of a separate action. In addition, the FS text will be revised to cite the specific provisions of each ARAR that will be implemented.

### Institutional Controls

1. Page 15 PP

- The third, fourth and fifth paragraphs refer to Institutional Controls (IC). What are the IC's and how was the potential exposure to the general public arrived at if IC's are lost?

**Response:** Specific examples of ICs will be included in the FS. 40 CFR 192 identifies situations under which supplemental standards (levels greater than the unrestricted general standards) may be developed. It does not specify how these standards are to be developed. For the two situations (roads, bridges and railroads, and subsurface soils with institutional controls) supplemental standards were developed using site specific risk scenarios and moving off the point of departure based on CERCLA criteria. These concentrations were also limited to assure that doses not exceed the 100 mrem/yr standard defined in 10 CFR 20.1403 for the situation where institutional controls are lost. The concentration limits are 36, 100 and 640 pCi/g, respectively, for Ra-226, Th-230, and U-238 for roads, bridges and railroads. For subsurface soils with institutional controls, the corresponding limits are 25, 70 and 250 pCi/g.

2. Page 18 PP, *Institutional Controls*

- MDNR disagrees that no ICs are required. The remediation does not reflect exposure caused by erosional processes.

**Response:** Do not concur. ICs would not be required at SLAPS VPs because these properties will be remediated to the unrestricted criteria. ICs addressing activities such as intrusion or erosion would be imposed at areas where ICs are used, e.g., roads, bridges, and railroads. Further, the development of the cleanup standards in 40 CFR 192 considered potential changes such as erosion.

3. Page 22 and 23 PP

- Alternatives 5 and 6 both note Institutional Controls (IC). Again, what is the IC's, how would they be implemented and enforced, if the areas become accessible who is responsible for excavation and disposal, and are engineering controls required?

**Response:** Concur that additional detail regarding ICs and long-term stewardship (LTS) is required. It is our belief that development of a LTS Plan, which would address responsibilities and controls, is a collaborative effort involving EPA, MDNR, local landowners, stakeholders, municipalities, and DOE. To attempt to complete this process prior to release of the FS/PP to the public would be presumptuous and premature. Efforts to outline a LTS Plan will be initiated with a draft "strawman" prepared prior to ROD signature. However, in an attempt to address MDNR's concern, some language elaborating on potential ICs will be added. Long-term stewardship of the site is the responsibility of DOE, so USACE will coordinate with DOE to provide more information concerning the specific institutional controls to be implemented at each property. The alternatives were developed consistent with the NCP preference for institutional controls to supplement engineering controls. The NCP states that "the EPA expects to use engineering controls ...for waste that poses a relatively low long-term threat or where treatment is impracticable. The EPA expects institutional controls...to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants."

4. Page 26 PP, upper right hand paragraph, last sentence

- DNR is unaware of any "current" land-use restrictions for transportation/utility corridors that would be protective to workers or the public. Please describe.

**Response:** Institutional Controls would include a provision for verifying continued use of these areas as transportation/utility corridors.

5. Page 26, right side, third paragraph

- Since there is residuals left on site at all properties, five-year reviews will be required in order to assure protectiveness of the remedy. Five-year reviews will need to include a groundwater-monitoring component.

**Response:** Do not concur. Five-year reviews are performed when hazardous substances, pollutants, or contaminants remain in place above levels that allow for unlimited use or unrestricted exposure (40 CFR 300.430(f)(4)(ii)). Under Alternative 5, the only areas with contamination present above these levels may be under roads, bridges, and railroads and under the Futura building. These areas may be subject to five-year reviews and ground-water monitoring. Properties remediated to the unrestricted release criteria do not require five-year reviews.



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