STATE OF MISSOURI Jeremiah W. (Jay) Nixon, State Governor • Kip A. Stephenson, Acting Director

DEPARTMENT OF NATURAL RESOURCES

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November 19, 2010

Mr. Paul Rosasco, P.E.
Engineering Management Support, Inc.
7220 West Jefferson Avenue, Suite 406
Lakewood, CO 80235

RE: Comments on draft Supplemental Feasibility Study (SFS)
West Lake Landfill Operable Unit 1, Bridgeton, Missouri

Dear Mr. Rosasco:

The Missouri Department of Natural Resources (MDNR) has completed its review of the above referenced document prepared by Engineering Management Support Inc. (EMSI) and is transmitting the enclosed comments. These comments have been compiled by the Department's Hazardous Waste Program, Federal Facilities Section, with assistance from other programs within the department and State agencies.

The Department has identified several key issues within this document that are considered important variables to this study. These are summarized as follows:

1. Verification of RIM (General Comment #1).
2. Volumes of waste proposed for relocation under the ROD remedy (General Comment #2).
3. Airport Negative Easement/FAA Advisory Circulars (General Comment #3).
4. Cap Design (General Comment #7).
5. Types of waste encountered during excavation (General Comment #9).
6. On-site railroad spur (Specific Comment #92).

We feel that these issues could have huge impacts on the outcomes of the SFS and ultimately the final decision for remedial actions at West Lake Landfill. Special care and consideration should be given to these issues to ensure a fair comparison has been made between the new remedial alternatives and current Record of Decision remedy.

It is our understanding that after submittal of these comments, EMSI will begin revision to the SFS and revised portions will be submitted to the U.S. Environmental Protection Agency and MDNR in piecemeal fashion to promote greater efficiency in revision and finalization of the document. The Department supports this approach and looks forward to assisting in all aspects of the document revision process including follow-on discussions of remaining issues.

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Superfund

Thank you for giving us the opportunity to review and comment on this document. If you have any questions pertaining to these comments please contact me by phone at (573)751-3107, or by written correspondence at P.O. Box 176, Jefferson City, MO 65102.

Sincerely,

HAZARDOUS WASTE PROGRAM

Shawn Muenks

Shawn Muenks, P.E.
Federal Facilities Section

SM:dd

c: Mr. Dan Gravatt, U.S. Environmental Protection Agency

Mr. Rich Kapuscinski, U.S. Environmental Protection Agency Headquarters

Enclosure

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Comments on the
West Lake Landfill Operable Unit 1
Draft Supplemental Feasibility Study

GENERAL COMMENTS:

1.) Verification of RIM

The total cost of the two new alternatives is heavily dependent on the volume and the characteristics of the Radiologically Impacted Material (RIM). The Department is uncertain that all radiologically impacted areas in the landfill fall strictly within municipal landfill areas. Therefore, we are uncertain that the higher cost of segregating and disposal of RIM that is intermixed with municipal like wastes is realistic. In particular, a large portion of Area 2 lies within close proximity to the Closed Demolition Landfill. The RIM in this area could be intermixed with more solid debris (i.e. soils and construction debris) rather than putrescible wastes, thus affecting segregation and disposal costs. In addition, the RIM identified at greater depths in Area 2 during the Remedial Investigation cause additional uncertainty in the overall cost of the new alternatives. Using available information, it is unclear whether RIM is located at these greater depths. Verification of RIM at these depths would clarify excavation and disposal costs of the new alternative.

The Department understands that many assumptions had to be made in order to attain the conclusions and cost estimates derived in this document. We also understand that these assumptions of volume and characteristics of the RIM are very sensitive variables as related to overall cost. The Department believes minimal sampling could be performed to clarify some of these assumptions, thereby leading to a more fair and reasonable comparison of the new alternatives versus the Record of Decision (ROD) remedy.

2.) Waste Relocation under ROD Remedy Alternative

The Supplemental Feasibility Study contains calculations for the ROD remedy that calls for relocation of approximately 57,000 cubic yards of waste from Area 1 and 160,000 cubic yards from Area 2 (pages 3 and 4 of ROD Remedy Cost Summary, Appendix I). This is inconsistent with the ROD Table 12-1 which has no provisions for relocation of waste. Please explain this inconsistency. Also, the Department has questions about the need for this much regrading in order to achieve sloping requirements. Please elaborate on volume calculations by providing cross sections showing current and final slopes.

3.) Airport Negative Easement/FAA Advisory

Section 3.1.2.2.1 of the SFS gives an explanation of the negative easement granted to the City of St. Louis restricting new or additional depositing or dumping of municipal waste, organic waste, and/or putrescible waste. Following the drafting of the SFS, a meeting was held on September 7, 2010, between the Respondents, representatives of EPA, and the St. Louis Airport Authority to discuss this negative easement. The Department was not informed prior to this meeting, after requesting to be a participant. The Department requests to be included in future meetings regarding this matter to observe and provide input related to Missouri Solid Waste Regulations and matters pertaining to this site.

The Department requests clarification on why this negative easement would prohibit the on-site disposal cell and sees this issue as an administrative restriction that can be dealt with accordingly in order to perform a fair comparison of the new alternatives presented in the SFS with the selected remedy in the Record of Decision (ROD) for West Lake Landfill. In addition, the SFS talks about the Missouri Solid Waste Regulations for landfill siting [10 CSR 80-3.010(4)(B)1.A] and the FAA Advisory Circular (AC 150/5200-33B) which require landfill units operating within 10,000 feet of a commercial airport to demonstrate that they are designed and operated so as not to pose a bird hazard to aircraft. The Department would like to see possible explanations on how these can be dealt with rather than how they may put limitations on the alternatives. The Department prefers the language presented in the first bullet on page 65 of the SFS.

4.) **Coordination with other Agencies**
Has the U.S. Army Corps of Engineers (USACE) been consulted about the excavation with off-site disposal alternative? The USACE has experience and expertise with this option due to their work on the Formally Utilized Sites Remedial Action Project (FUSRAP). Have experts at the Department of Energy been contacted for input on the onsite disposal cell alternative? The Department also encourages continued contact with the St. Louis County Health Department throughout the development of the SFS and into the Remedial Design phase.

5.) **Documentation Required**
This SFS does not discuss all the documents that will be needed to implement the remedial alternatives as discussed in the SFS Workplan. Please discuss the documents that are to be completed in conjunction with these remedial alternatives. For example; materials handling plan, surface water management plan, methane gas emergency plan, plans related to asbestos containing materials and mixed wastes, evaluations of principle threat wastes, and other plans that will be needed prior to remedy implementation.

6.) **Ambient Air Monitoring for Non-radiological Contaminants**
The Department notes that the chemical risk assessment referenced in the SFS (*Baseline Risk Assessment (Appendix A to Remedial Investigation Report), West Lake Landfill Operable Unit 1*, Auxier & Associates, Inc., April 24, 2000) presents risk from exposure to soils that, due to the presence of waste, could not be completely characterized. This supports the need to further characterize the waste and require analysis of ambient air for non-radiological contaminants of potential concern (COPC) identified in the baseline risk assessment (BRA) during the remediation. This includes air monitoring for friable asbestos. Please add this discussion to the SFS.

7.) **Cap Design**
The Department would like to see more research related to the cover design for this climate location (i.e. rock armor layer located below, intermixed, or on top of low permeable clay cap). Also the size and quality of rock used for the cover should be studied in more depth to meet longevity requirements.

[The following General Comments are repeat issues presented in MDNR comments to the Supplemental Feasibility Study (SFS) Workplan dated February 22 and April 30, 2010.]

8.) UMTRCA as a Potential ARAR

Section 3.1.1.1.1 Standards for Cleanup of Contaminated Land – 40 CFR 192.12(a); this section gives a lengthy explanation on why the Uranium Mill Tailings Radiation Control Act (UMTRCA) standards are not considered Applicable or Relevant and Appropriate (ARAR) to portions of the landfill. While the Department does not necessarily disagree with using the cleanup standard of 5 pCi/g as a suitable cleanup for subsurface contamination at this site, the Department is uncertain why the UMTRCA standards is not included as ARAR for the entire landfill for the following reasons:

A. The current ROD states that soil standards found in the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192 Subpart B) are relevant and appropriate requirements for the cleanup of any radiologically impacted soil that may be present on the Buffer Zone/Crossroad Property. The Department is uncertain why the UMTRCA standards would be ARAR for contamination that originated from the landfill and not ARAR for the contamination remaining in the landfill.
B. The ROD states that the UMTRCA radon standard is relevant and appropriate for OU-1 and the radon that is generated from the waste in the landfill. Why wouldn't the standards in 40 CFR 192.12(a) also be considered ARAR for OU-1 and the waste in the landfill?
C. The ROD states that the groundwater protection standards [40 CFR 192.02(c)(3) and (4)] and monitoring requirements (40 CFR 192.03) of the UMTRCA regulations are relevant and appropriate and must be met. Again, if these standards are considered ARAR for contamination from OU-1, why wouldn't the standards in 40 CFR 192.12(a) also be considered ARAR for OU-1.
D. The ROD states that UMTRCA is an ARAR for the closure performance and cap longevity as it relates to wastes within the landfill. It is unclear why the standards in 40 CFR 192.12(a) would not also be consider ARAR for the waste within the landfill if it was decided to excavate the RIM.

9.) RCRA Characteristic Waste

If characteristic Hazardous Waste is encountered and generated during excavation, appropriate treatment and disposal will be required for both new alternatives (i.e. disposal cell designed to a Subtitle C hazardous waste landfill or treatment prior to offsite disposal). Please amend the SFS to include these criteria or an alternative treatment and disposal method (offsite treatment and disposal for the onsite disposal alternative). In addition, handling and stockpiling of characteristic Hazardous Waste will require special considerations that should be included in the SFS (see ARAR list included with these comments).

In addition, description in the SFS should be included on what actions will be taken if asbestos or other wastes are encountered for both new alternatives.

10.) **Post-remediation Risk Assessment**
The Department recommends that a post-remediation risk assessment be performed to confirm that residual radiological constituents meet acceptable risk levels. A final status survey (FSS) approach to ensure the protectiveness of release criterion is recommended. A site-specific risk assessment, which may be performed using the RESRAD platform for radionuclides, will be required to verify that cleanup has achieved proper compliance. Please provide discussion in the SFS on the feasibility of performing such an assessment for each of the alternatives.

11.) **Radon**
The work plan needs explanation on how off-site radon migration will be addressed for the new remedial alternatives. Appropriate measures should be included in the SFS alternatives to prevent off-site exposures (including indoor air sampling of adjacent buildings and monitoring of new and existing gas collection systems for presence of radon).

12.) **Sum of Ratios**
The work plan does not have a discussion of using sum of ratios computation for radiological cleanup levels (see the Multi-Agency Radiation Survey and Site Investigation Manual, MARSSIM). The Department recommends using this approach. Please include a discussion on applicability of this method during cleanup activities according to 10 CFR 40 Appendix A Criteria 6(6). It is noted that this criteria must be met for Waste Acceptance Criteria of some of the disposal facilities.

SECTION-SPECIFIC COMMENTS:

13.) **Table of Contents** – Please expand the Table of Contents to include all subsections. This will make it easier to locate specific topics.

14.) **Section 1.2 Scope and Approach, page 3** – The document is inconsistent throughout as it relates to "State Acceptance". The Department prefers the sentence describing "State Acceptance" found on page 74 "State and community acceptance will be evaluated by EPA as part of any decision process that may be undertaken by EPA after completion of the SFS."

15.) **Section 2 SITE CONDITIONS, page 6** – This section does not discuss non-radiological contamination. An overview of the chemicals of concern detected in the remedial areas should be provided.

16.) **Section 2.1 Site and Surrounding Area Land Uses, page 6** – This section does not mention residential land use in the surrounding area such as the Spanish Village residential area. Also, it does not include information on possible groundwater use of the surrounding area. Any city or county ordinances prohibiting installation of drinking water wells in proximity of the site should also be identified. It was also noted that Area 2 and

the Closed Demolition Landfill were zoned "residential" in Figure 2-5 of the OU-1 Feasibility Study and that requests have been made to change this zoning. Please provide follow-up information on this aspect.

17.) **Section 2.1 Site and Surrounding Area Land Uses, page 6** – The document states "These operations were not subject to state permitting because they occurred prior to formation of the MDNR in 1974." It may be more accurate to state the operation occurred prior to laws and regulations regulating such operations.

18.) **Section 2.2.1 General Nature of the RIM, page 7** – The document states the USACE manages the FUSRAP. It would be worth noting that the Department of Energy's Legacy Management will manage the long term surveillance and monitoring of the FUSRAP sites.

19.) **Section 2.2.1 General Nature of the RIM, page 8-** The document states "Data collected during the RI are consistent with this account." when discussing the radiologically contaminated soil was used as cover over municipal refuse. Please include and discuss the data from the RI that supports these statements.

20.) **Section 2.2.2 Cleanup Levels, page 9** – The last sentence of the first paragraph states, "Additional discussion regarding the development of the uranium remediation level is presented in the SFS Work Plan." As stated in previous comments on the SFS Work Plan, the Department would like to see a detailed risk calculation of the uranium cleanup level of 50 pCi/g included in this SFS. It is the Department's understanding that the uranium cleanup level is a risk-based value and that background concentrations should not be added to it to attain a cleanup goal.

21.) **Section 2.2.2 Cleanup Levels, page 9** – The last sentence of the third paragraph states, "Consequently determination of background levels is an important part of the development of the soil cleanup levels for the "complete rad removal" alternatives." The Department would like to reiterate the need for additional sampling during the Remedial Design to verify background values. EPA's document *Role of Background in the CERCLA Cleanup Program*, OSWER 9285.6-07, April 2002, in conjunction with MARSSIM, should be consulted. Please include provisions in the SFS to accommodate this activity. Also, please provide the maximum detected concentration for each radionuclide in the unlabeled table. This will allow the reader to determine whether the proposed background concentrations exceed the maximum detected concentration. The proposed concentration cannot exceed the maximum.

22.) **Section 2.2.2 Cleanup Levels, page 11** – The Department would like to see a more in-depth discussion on how the derived concentration guideline (DCGL) for the parent and daughter radionuclides was calculated. In particular, the Uranium-238 decay chain has Thorium-234, Uranium-234, Thorium-230, and Radium-226 as parent-daughter relationships. Should these all have been set to the lowest value calculated for any one member?

23.) **Section 2.2.2 Cleanup Levels, pages 9-12** – The approach used to estimate cleanup levels (CLs) should be consistent with the Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) memorandum *Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites*, OSWER Directive 9200.4-25, February 12, 1998. This guidance requires that a site-specific risk assessment be used to assess the protectiveness of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. 7918) (UMTRCA) CLs for radium and thorium. The memorandum *Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6)*, OSWER Directive 9200.4-35P, April 11, 2000, supports the requirement that a risk assessment be performed. RESRAD software may be utilized to perform this assessment.

24.) **Section 3.1.1 Potential Chemical Specific ARARs** – Additional chemical specific ARARs are provided in the ARAR table. Please note the MCL for Arsenic has changed since the OU-1 FS was drafted. Please confirm if other updated values are available.

25.) **Section 3.1.1.1.1 Standards for Cleanup of Contaminated Land – 40 CFR 192.12(a), page 17** – The first paragraph on this page contains the statement, "Furthermore, EPA indicated in the SOW that even if a "complete rad removal" alternative were to be implemented, waste materials would still remain on site thereby requiring institutional controls." The last paragraph on this page contains the statement, "EPA (2010d) has indicated that 'One intent of the 'complete rad removal' alternatives, if implemented, would be to leave disposal Areas 1 and 2 in a condition that would not require additional engineering and institutional controls due to their radiological content, if feasible.'" These statements need more supporting detail. Please consider clarifying which engineering and/or institutional controls will remain for the new alternatives.

26.) **Section 3.1.1.1.1 Standards for Cleanup of Contaminated Land – 40 CFR 192.12(a), page 18** – Please see General Comment related to UMTRCA as a potential ARAR.

27.) **Section 3.1.1.1.1 Standards for Cleanup of Contaminated Land – 40 CFR 192.12(a), page 18** – The last sentence of this section states, "This OSWER Directive could therefore be relevant and appropriate to the Crossroad property." The regulations (40 CFR 192) should be considered ARAR while the directive itself could be considered a TBC. Please correct this within the document.

28.) **Section 3.1.1.1.2 Radon Emissions Standards – 40 CRF 192.02(b)** – Are there any ARARs related to radon in occupied buildings? The Institutional Controls proposed in the document do not restrict industrial use of the landfill itself or land adjacent to the landfill. These buildings should be continually monitored for radon especially after the final cap is placed under the ROD remedy and on-site disposal cell alternative.

29.) **Section 3.1.1.2 Other Potential Chemical-Specific ARARs, page 19** – This section should also include ARARs associated with potential hazardous substances that may be encountered during excavation such as PCBs or asbestos, as referenced in the SFS Work Plan. Regulations relative to PCBs can be found in Toxic Substances Control Act (15

U.S.C. 2605) Paragraph (e). Current PCB regulations can also be found in the Code of Federal Regulations (CFR) at 40 CFR 761. Asbestos-containing material is regulated by the Missouri Department of Natural Resources Air Pollution Control Program, consistent with the Code of Federal Regulations, Title 40, Part 61, Subpart M, National Emission Standard for Asbestos, or NESHAP (40 CFR 61).

30.) **Section 3.1.1.2.3 Missouri Maximum Contaminant Levels, page 21** – The document mentions both Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) but only MCLs are considered potentially relevant and appropriate. Please discuss MCLGs and whether they are potentially ARAR. Please note the National Contingency Plan (NCP) requires that groundwater remedy attain non zero MCLGs. In addition, the Federal MCLs and MCLGs should be assessed for ARARs (40 CFR 141). Also, please note that Missouri Water Quality Standards (10 CSR 20-7.031) are potential ARARs.

31.) **Section 3.1.2.2 Missouri Solid Waste Management Regulations – Site Selection, page 22** – The reference to 10 CSR 80.3(4) in the first paragraph should be 10 CSR 80-3.010(4).

32.) **Section 3.1.2.2 Missouri Solid Waste Management Regulations – Site Selection, page 22** – The construction of a new solid waste disposal area for excavated, non-radioactive waste would have to comply with all current Solid Waste Rules and Regulations [10 CSR 80-2.010, 10 CSR 80-2.015, 10 CSR 80-2.020, and 10 CSR 80-2.030] and [10 CSR 80-3.010] for construction of a new landfill. This rule is intended to provide for sanitary landfill area operations that will have minimal impact on the environment. The rule sets forth requirements and the method of satisfactory compliance to ensure that the design, construction and operation of sanitary landfills will protect the public health, prevent nuisances and meet applicable environmental standards. Please include these regulations in the ARAR consideration for site selection.

33.) **Section 3.1.2.2.1 Missouri Solid Waste Regulations – Airport Safety, page 24-** The document states "These regulations require a proposed new landfill unit to be located within 10,000 feet of an airport that has jet traffic to demonstrate to the MDNR and to the airport that the landfill operations will not pose a bird hazard to air traffic." The regulation does not require a demonstration to the airport. Only notification is required if located with a 5 mile radius. Please remove the words "and to the airport".

34.) **Section 3.1.2.2.1 Missouri Solid Waste Regulations – Airport Safety, Page 24** – This section contains paragraphs that discuss the FAA Advisory Circular and the negative easement. These are not part of Missouri Solid Waste Regulations nor are they considered ARARs. Please remove the FAA Advisory Circular and negative easement from this section.

35.) **Section 3.1.2.2.1 Missouri Sold Waste Regulations – Airport Safety, Page 24** – Please provide a copy of the FAA Advisory Circular within the appendices.

36.) **Section 3.1.2.2.1 Missouri Solid Waste Regulations – Airport Safety, page 24** – The last sentence of the second paragraph states, "The relocation and disposal of excavated RIM material containing putrescible waste within 10,000 feet of the westernmost runway at Lambert Airport, as would occur during excavation and relocation of the RIM in Areas 1 and 2 to the only potentially suitable location for an on-site engineered disposal cell, is limited by site selection criteria in the Missouri solid waste regulations and the FAA Advisory Circular." The Department believes that additional characterization of wastes (putrescible vs. construction debris) and/or engineering controls during excavation and placement of waste can effectively resolve these limitations. The Department would like to see explanations on how these issues can be dealt with rather than labeling them as "limitations".

37.) **Section 3.1.2.2.1 Missouri Solid Waste Regulations – Airport Safety, page 24-** Throughout the document, the wastes located in Area 1 and Area 2 are considered putrescible waste. Please provide greater explanation on where the "putrescible waste" is located. Please use evidence such as boring logs, field observations, or other credible information that characterizes the nature of the wastes. Significant decision and comparisons of alternatives within this document rely upon this information. We feel additional analysis is needed to determine the nature of the waste.

38.) **Section 3.1.2.2.2 Missouri Solid Waste Management Regulations – Floodplains, page 25** – The reference to 10 CSR 80-3.010(4)(B)(2) in the first paragraph of this section should be 10 CSR 80-3.010(4)(B)2.

39.) **Section 3.1.2.2.7 Missouri Solid Waste Management Regulations – Base of Landfill, page 27** – The Missouri Solid Waste Management Program prefers one foot minimum separation from soil liner and groundwater, which is the present policy. Please amend this section to include this preference.

40.) **Section 3.1.3.1, page 28** – This section describes UMTRCA requirements such as placement of a rock armoring layer to address longevity considerations. In particular, this component should address the standard set by 40 CFR 192.02(a), "Control of residual radioactive materials and their listed constituents shall be designed to be **effective for up to one thousand years to extent reasonably achievable**, and, in any case, for at least 200 years". Please provide a better explanation on how this standard will be met using the rock armor layer. There are other sites that have used this type of cover system with slight variations in configuration. Those sites should also be researched and the results presented in this report in order to select the best design for capping Areas 1 and 2 under the current ROD and the new on-site cell alternative.

41.) **Section 3.1.3.1, page 28** –The document uses the term "gravel" which is inconsistent with ROD. The Department prefers an analysis of cap design based on the ARARs (UMTRCA 40 CFR 192.02(a), be effective for up to 1000 years). We feel the UMTRCA standard typically calls for something more substantial than "gravel".

42.) **Section 3.1.3.2 Missouri Solid Waste Management Regulations, page 29** – Overall, this section needs more detail on the specific Missouri Solid Waste Regulations that will be ARARs for the new alternatives. Namely, the last paragraph of this section needs more detail on which Missouri Solid Waste Regulations would be considered ARARs for the on-site disposal cell. In addition, as stated previously in MDNR comments on the SFS Work Plan, the issue of Solid Waste Regulations prohibiting disposal of radioactive wastes in a permitted Solid Waste Landfill needs to be addressed in this section [10 CSR 80-3.010(3)(A)1 and 10 CSR 80-3.010(3)(A)2 A thru I].

43.) **Section 3.1.3.2 Missouri Solid Waste Management Regulations, page 29** – If characteristic Hazardous Waste is encountered and generated during excavation, appropriate treatment and disposal will be required for both new alternatives (i.e. disposal cell designed to a Subtitle C hazardous waste landfill or treatment prior to offsite disposal). Please consider RCRA Subtitle C as a potential ARAR depending on types of wastes encountered during excavation (see General Comment on RCRA Characteristic Waste).

44.) **Section 3.1.3.2 Missouri Solid Waste Management Regulations, page 29** – The reference to 10 CSR 80-3.010(17)(C)(4) at the end of the third paragraph should be 10 CSR 80-3.010(17)(C)4.

45.) **Section 3.1.3.2 Missouri Solid Waste Management Regulations, page 29** – The last sentence of this section states, "In contrast to the final grades for Areas 1 and 2, as the new on-site disposal cell would be a new unit, final grading of this cell would need to meet the minimum slope requirement of 5%." Similarly, for the excavation alternatives the excavated areas in Area 1 and 2 should be reconstructed to meet the 5% minimum sloping requirement as well. The 2% minimum sloping requirement allowed in the ROD remedy is only applicable to undisturbed landfill areas.

46.) **Section 3.2 Additional Requirements Associated with Off-site Disposal, page 30** – The third sentence states, "First, the ARARs provision applies only to on-site actions; off-site actions must comply fully only with any laws that legally apply to that action." Should this read "...fully and only..."?

47.) **Section 3.2.2 Off-site Transportation Requirements, page 31-32** – In addition to U.S. DOT regulations, Missouri Revised Statute section 260.392, RSMo (radioactive waste transport fees) will also apply.

48.) **Section 3.2.2 Off-site Transportation Requirements, page 31-32** – The document states "Discussions with representatives of potential off-site disposal facilities have indicated that most of the facilities would provide a turnkey service that includes transport of the RIM from the West Lake site and disposal." Is this the best and most economical method of transporting and disposing of RIM to an offsite disposal facility? Since the cost of transport and disposal is the most significant cost variable, it is important to support this decision. Please provide an analysis of the various transportation and disposal methods and associated costs.

49.) **Section 3.3.1 Previously Established Remedial Action Objectives, page 35** – These RAOs are specific to Areas 1 and 2. The RAO for the Buffer Zone/Crossroad Property should also be included. Also, the RAOs from the ROD should be used instead of referencing the ones from the FS, even though these may be the same.

50.) **Section 3.3.2 Additional Remedial Action Objectives for the SFS, page 36** – The Department is unclear why an additional RAO is needed that only applies to the new alternatives. Also the RAO should not prescribe remedial actions. Please remove this RAO.

51.) **Section 4.3.1 Short-term Monitoring During Construction, page 40** – Air Quality Standards (AQS) are not referenced for ambient air monitoring. Missouri Code of State Regulation 10 CSR, Chapter 6 - *Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri*, Appendix J, *Air Quality Analysis for Hazardous Air Pollutants*, references Risk Assessment Levels (RALs) for the state. RALs are screening levels for non-radiological contaminants in ambient air. The RALs are available through the Missouri Department of Natural Resources Air Pollution Control Program. In the absence of chemical-specific RALs, EPA's national risk-based screening levels (SLs) website is http://www.epa.gov/reg3hwmd/risk/human/index.htm. Site-specific PRGs, developed by back calculating the formula presented for risk in the BRA, can be used in lieu of AQS and RALs. Before using the PRGs, the formula, including exposure factors, must be determined to meet current EPA guidance. SLs that are chosen must be protective for the on and offsite receptor.

For radionuclides, radionuclide-specific ambient air SLs are just now becoming available through EPA. Screening tables for different receptors for exposure to radionuclides are available at the EPA website http://epa-prgs.ornl.gov/radionuclides/download.shtml. For ambient air, unless radionulide-specific analysis is performed, alpha and beta action levels must be provided, either as an ARAR or by calculation. Applicable or relevant and appropriate requirements (ARARs) must be supported by calculations using site-specific data to determine if they are protective.

52.) **Section 4.3.1 Short-term Monitoring During Construction, page 40** – The Department is concerned about exposure to radionuclides from removal of vegetation. The Standard

Level IV Report of Analysis prepared by T.A. Woodford & Associates, March 27, 2009, should be analyzed in detail for risk of exposure from vegetation clearing activities. The results can be evaluated within EPA's DCAL software to estimate age-specific dose coefficients for members of the public. Ambient air screening levels may be estimated using formulas presented within EPA's *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)*, EPA/5401/1-89/002, December 1989, or the Nuclear Regulatory Commission report *Residual Radioactive Contamination from Decommissioning, Volume 1; Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent*, NUREG/CR-5512, September 1992. Burning of vegetation should be prohibited due to lowering of air quality in this populated area, and uncertainty in estimating the amount of radiological contamination within the emissions. In general, this section should discuss risks associated with vegetation clearing and methods to prevent exposure for these activities.

53.) **Section 4.3.3 Solids Separation, page 42** – The document concludes that segregation of RIM could not be assessed at this time. The Department considers volume of RIM an important variable in overall comparisons of alternatives. Please provide an analysis of segregation of wastes. Additional characterization information defining the nature of the wastes (debris vs. RIM) may be needed to perform this analysis.

54.) **Section 4.3.6 New On-Site Disposal Cell, page 44** – The first sentence of this section states, "The 'complete rad removal' with on-site disposal alternative would involve construction of an engineered cell of sufficient volume to contain excavated RIM from Areas 1 and 2 with a liner system that meets MDNR solid waste management plan (SWMP) regulations and a cover system that meets SWMP and UMTRCA requirements." Please change "solid waste management plan" to "Solid Waste Management Program". Also please include in this statement a description that the liner and cover should include leachate and gas collection systems and gas and groundwater monitoring systems. Also, the cell design should be developed and described based on the longevity requirements of UMTRCA.

55.) **Section 5.2.2 Environmental Monitoring, page 51** – The document mentions a "one-time radon monitoring event to verify compliance with the radon emissions ARARs". It is unclear how a "one-time event" will provide assurance that the ARARs are attained throughout the life of the radiological parents. Additional analysis of the growth of radon emission throughout the life of the radiological contaminants is needed to determine if a "one-time event" is sufficient. However, for the purposes of this SFS, one radon monitoring event may be sufficient given the minor cost associated with this activity as long as it is stated that additional monitoring may be identified during the remedial design.

56.) **Section 5.2.2.3 Groundwater Monitoring, page 54** – The document states "After the first three years of baseline monitoring, it is assumed that the groundwater monitoring would be conducted **semiannually** on a **biannual** basis to identify any changes that may occur in the future." Please consider clarifying this sentence. Similar sentences occur elsewhere in the document.

57.) **Section 5.2.2.3 Groundwater Monitoring, page 54** – The document states "As these wells would only be sampled infrequently and the goal of the monitoring program would be to identify changes in water quality over time, not to simulate drinking water conditions, the samples would be filtered in the field and the analyses would reflect the dissolved fraction only." The Department does not agree with using filtered samples alone to determine compliance with ARARs (MCL, MCLG, MWQS, etc.) Please remove this statement.

58.) **Section 5.2.2.4 Landfill Gas Monitoring, page 54** – The document includes the regulatory threshold for landfill gas (methane) but not for radon. Please include this within the text.

59.) **Section 5.2.2.5 Five Year Review, page 55** – The Five Year Review includes an overall "Protectiveness Statement". Please mention this within the section.

60.) **Section 5.3.2.1 RIM Excavation Procedures and Sequencing, page 59** – The document states "Using the subsurface characterization data, health physics (HP) technicians would instruct the excavator operator where to remove filled materials, which would be performed in lifts within grids." We recommend changing this sentence to read: "Using the newly collected subsurface characterization data, health physics (HP) technicians would instruct the excavator operator where to remove filled materials, which would be performed in lifts within grids."

61.) **Section 5.3.2.2 Radiological Surveys during RIM Excavation, page 60** –The availability of quick laboratory data will be essential to confirming excavation are in need of additional removal or whether the excavation is complete. Please provide an analysis of onsite vs. offsite laboratory analysis and how this will affect costs.

62.) **Section 5.3.3 Excavation of RIM with Off-site Commercial Disposal Alternative, page 63** – The second paragraph on this page states, "For purposes of preparing a cost estimate for this alternative in this SFS, it was assumed that excavated RIM would be loaded into 35 cubic yard soft-sided shipping container bags and hauled via truck to a truck-to-rail transloading operation at a rail spur location near the West Lake Landfill site (assuming a location could be identified) and that four 35 cubic yard bags would be shipped in each 148 cubic yard gondola car to one of the off-site disposal facilities described in Section 4.3.7." The Department would like to see the on-site rail spur included in the cost estimates. The Department feels that this is a viable, and likely preferred method for off-site transport.

63.) **Section 5.3.4.1 Siting of On-site Cell, page 64-65** – It was noted during review that the potential on-site disposal cell location is located south of the on-site storm-water retention pond. As the apparent groundwater flow direction on the West Lake Landfill site is to the south, it is possible the groundwater in this area could be mounded and potentially impact the placement of the base of the liner or the leachate collection system, as well as the

geologic stability of the soils in the potential location. Please consider this during siting of the on-site disposal cell.

64.) **Section 5.3.4.1 Siting of On-site Cell, page 65** – The last bullet in this section references 10 CSR 80-2.015(1)(B). The Department feels that this reference should include the entire section, 10 CSR 80-2.015.

65.) **Section 5.3.4.2 General Configuration of On-site Cell, page 66** – The second bulleted list gives configuration of the final cover system. The Department has noted that the biointrusion layer is located beneath the solid waste landfill cover system. As stated in previous comments, the Department would like to see research of other sites that have used this type of cover system and results provided that support the design proposed in this SFS.

66.) **Section 5.3.4.2 General Configuration of On-site Cell, page 66** – This section describes the final cover system. In particular, the components of this system should address the standard set by 40 CFR 192.02(a), "Control of residual radioactive materials and their listed constituents shall be designed to be **effective for up to one thousand years to extent reasonably achievable**, and, in any case, for at least 200 years". Please provide a better explanation on how this standard will be met using the proposed cover system. There are other sites that have used this type of cover system with slight variations in configuration. Those sites should also be researched and the results presented in this report to select the best design for capping the new on-site cell.

67.) **Section 5.3.4.2 General Configuration of On-site Cell, page 66** – The third sentence in the last paragraph states, "As the new cell would be constructed on-site, no permits would be required; however, in accordance with the NCP, the substantive requirements of the siting and permitting portions of these regulations would be considered during the conceptual design." The Department understands that CERCLA allows for on-site disposal without permit issuance; however, the Missouri Solid Waste permitting regulations may be ARAR and thus may require a waiver. Please review these regulations for applicability (10 CSR 80-2.015, 10 CSR 80-2.020, 10 CSR 80-2.021, 10 CSR 80-2.030, 10 CSR 80-2.031, and others in this chapter that may apply).

68.) **Section 5.3.4.2 General Configuration of On-site Cell, page 66** – Please define "low permeability earthen liner" in this section (i.e. give value of coefficient of permeability).

69.) **Section 5.3.4.3 Liner Construction – On-site Cell, page 68** – The document states "Any collected leachate would be shipped to an off-site facility for treatment and disposal. All of the facilities discussed in Section 4 (e.g., U.S. Ecology, Inc., EnergySolutions, and Clean Harbors) are permitted to accept liquids with parameters that might be present in leachate collected from the on-site cell." Please provide an analysis of on-site treatment and discharge (through MSD or through an ARAR permitting discharge) of leachate. Also consider on-site treatment of stormwater.

70.) **Section 5.3.4.4 Filling of On-site Cell with RIM, page 69** – The last sentence of this section calls for RIM placement in 8-10 ft thick lifts. The Missouri Solid Waste Management Program regulations state a requirement of 2 foot lifts that should be considered for ARAR. In addition, UMTRCA requires a design to be effective for up to one thousand years to extent reasonably achievable, and, in any case, for at least 200 years. Please provide a better explanation on how this standard will be met by including an analysis of predicted differential settlement and whether the cap system will fail due to unacceptable settlement. The lift thicknesses may need to be modified based on this analysis.

71.) **Section 5.3.4.5 Cover Construction – On-site Cell, page 69** – The second sentence of this section refers to 10 CSR 80-3.010(17)(C)(4)(B). This should be 10 CSR 80-3.010(17)(C)(4)B. The second paragraph gives the symbol for well graded gravel to be GP. The symbol for well graded gravel is GW. The last paragraph titled "Protective Drainage Layer" calls for this layer to be constructed of sand (SM). Soil type SM is not advised for the drainage layer. The Solid Waste Management Program instead recommends using SC.

72.) **Section 5.3.4.5 Cover Construction – On-site Cell, page 69** - The document uses the term "gravel" which is inconsistent with ROD. The Department prefers an analysis of cap design based on the ARARs (UMTRCA 40 CFR 192.02(a), be effective for up to 1000 years). We feel the UMTRCA standard typically calls for something more substantial than "gravel." Gravel is classified as typically No. 4 to 3 inch material.

73.) **Section 5.4.3.6 OM&M Components – On-site Disposal in Engineered Cell Alternative, page 71** – The section references 10 CSR 80-2.030(4)(A)3.E(I). This should be 10 CSR 80-2.030(4)(A)3.

74.) **Section 5.4.3.6 OM&M Components – On-site Disposal in Engineered Cell Alternative, page 71** – The requirement for monitoring for a period of 30 years may not meet the UMTRCA standards. Please consider longer periods of monitoring for the on-site disposal cell alternative.

75.) **Section 5.3.5 Closure Construction – Remaining Solid Waste Areas of Areas 1 and 2, page 72** – The first paragraph of this section references 10 CSR 80-3.010(17)(C)(4)(A). This should be 10 CSR 80-3.010(17)(C)4.A. Also, the first sentence of the second paragraph states, "In order to safely access and remove RIM described previously, it could be necessary to temporarily excavate and stockpile solid wastes (overburden wastes) that currently lie on top of the RIM." The Missouri Solid Waste regulations require prior approval from the Department to perform such actions. In particular, 10 CSR 80-2.030(3)(D) requires approval for the location where excavated material is to be deposited. Please consider this as an ARAR.

76.) **Section 6.1.7 Costs, page 80** – The document states "The cost estimates presented in the FS (EMSI, 2006) for remedial alternatives L4 and F4, which most closely parallel the ROD remedy, were reviewed, revised and updated to reflect additional requirements contained in the ROD, the results of preliminary engineering evaluations performed during preparation of the RD Work Plan (EMSI, 2009), and current published unit costs and cost factors." Please describe the "additional requirements contained in the ROD".

77.) **Section 6.1.7.1 Capital and Operation, Maintenance, and Monitoring Costs, page 82** – The documents states the unit weight based on experience from other sites and engineering judgment of the existing in-place filled material is equal to 1,500 pounds per **cubic foot**. This seems to be a typographical error. Please review for correctness.

78.) **Section 6.1.7.1 Capital and Operation, Maintenance, and Monitoring Costs, page 83** – The documents states that cost to treat water could be significant, even though no analysis is provided. Please provide an analysis of on-site vs. off-site water treatment. The cost to ship water to an off-site facility for treatment could be significant and other sites within the state have successfully treated water generated under similar conditions on-site. The on-site disposal cell option may have additional water treatment needs that should be considered and compared.

79.) **Section 6.1.9 Community Acceptance, page 85** – The Department understands that a formal community relations plan specifying the community relations activities that EPA and the Respondents plan to undertake during the remedial response for the new alternatives is under development. The Department requests the opportunity to provide input on this community relations plan. The Department also suggests that EPA and the Respondents look into forming and assisting with a community advisory group based on interest of the various stakeholders involved in the site.

80.) **Section 6.2.1 Regrading and Enhanced Capping (ROD Remedy), page 86** – The description of regrading presented in this section is not consistent with the ROD. The ROD states the selected remedy includes: "The landfill berm around Area 2 will be regraded through placement of additional clean fill prior to placement of the landfill cover resulting in an estimated 100 lateral feet of additional material between the current landfill toe and the toe at completion of the RA.". Please revise to be consistent with the current ROD. Also describe any changes in regrading plans that may have arisen since finalization of the ROD.

81.) **Section 6.2.1.1 Overall Protection of Human Health and the Environment, page 87** – The listed pathways of exposure exclude external exposure in the form of ground shine. This pathway must be included.

82.) **Section 6.2.1.1 Overall Protection of Human Health and the Environment, page 87** – The third paragraph describes the retarding or diversion of vertical migration of radon by use of landfill cover. Please also include a description of how horizontal radon migration will be mitigated.

83.) **Section 6.2.1.1 Overall Protection of Human Health and the Environment, page 87** – The last sentence of the third paragraph states, "The radon may also be intentionally vented or diverted to a gas control system." Please describe long-term monitoring requirements for radon within the gas control system and protective measures to prevent exposure.

84.) **Section 6.2.1.2.1 Missouri Solid Waste Rules for Sanitary Landfills, page 88** – Two of the Missouri Solid Waste regulations are misquoted. Please amend as follows: 10 CSR 80-3.010(17)(C)(4) should be 10 CSR 80-3.010(17)(C)4 and 10 CSR 80-3.010(17)(B)(7) should be 10 CSR 80-3.010(17)(B)7.

85.) **Section 6.2.1.2.2 Environmental Protection Standards for Uranium and Thorium Mill Tailings, page 89-90** – The regulation 40 CFR 192 Subpart B provides thorium standards for surface and subsurface soils. As recommended in EPA's directive *Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites*, OSWER Directive 9200.4-25, February 12, 1998, cleanup standards for thorium-232 (Th-232) and thorium-230 (Th-230) must not allow for the combined level of thorium-230 and thorium-232 to radium to exceed 5 picocurries per gram (pCi/g). This should be verified using RESRAD or other acceptable computation method.

86.) **Section 6.2.1.3.2 Adequacy and Reliability of Controls, page 93** – The second sentence of this section states, "Cover construction is based and relies on use of natural materials that should remain in place and meet performance criteria for at least 200 years as required by the UMTRCA ARARs." The UMTRCA ARARs specify that the design shall "be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years..." Please amend to state this. Also, the Department would like to see scientific data or studies from other sites that this design will meet these performance criteria.

87.) **Section 6.2.1.3.1 Magnitude of Residual Risks, page 92** – The document states "After soils are removed from the Buffer Zone/Crossroad Property to below cleanup levels, **no residual risk will remain**." It is our understanding that residual risk will remain for areas that are left at concentrations above background. This statement also occurs elsewhere within the document.

88.) **Section 6.2.1.3.2 Adequacy and Reliability of Controls, page 93** – The first sentence of the second paragraph states, "Covenant restrictions have been recorded by each of the owners against their respective parcels and the entire West Lake Landfill (including Areas 1 and 2 and the soil borrow/soil stockpile area) prohibiting residential and groundwater use." Please list the owners, parcel information, and include copies of the covenant restrictions in the SFS. The next sentence states, "Construction work, as well as commercial and industrial uses, has been precluded on Areas 1 and 2 by a Supplemental Declaration of Covenants and Restrictions recorded by Rock Road Industries, Inc., prohibiting the placement of buildings and restricting the installation of underground

utilities, pipes and/or excavation upon its property." Please include a copy of this covenant as well in the SFS.

89.) **Section 6.2.1.5.5 Time Until Remedial Action Objectives are Achieved, page 96** – The second sentence of the first paragraph states, "The other RAOs would be achieved upon completion of construction which is estimated to be finished within approximately 2.5f to 4 years of approval of the remedial design." Should this read "2.5 to 4 years"?

90.) **Section 6.2.1.6.7 Availability of Off-site Treatment, Storage and Disposal Services and Capacity, page 99** – This is inconsistent with prior sections stating that treatment of collected waters may be needed.

91.) **Section 6.2.1.7 Cost, page 99** – The Department recommends including a more representative cost of operations and maintenance of the remedy in perpetuity. This would better represent true cost. We understand the 30-year present worth cost may not significantly change. Also, does this cost include oversight costs?

92.) **Section 6.2.2 "Complete Rad Removal" with Off-site Disposal Alternative, page 101** – The first sentence on this page states, "For purposes of this SFS, it has been assumed that extension of a rail spur onto the site would not be feasible due to anticipated difficulties with construction and operation of a rail line across St. Charles Rock Road. The Department disagrees with this conclusion. The Department feels that construction and operation of a rail spur across St. Charles Rock Road is completely feasible and in fact would be more efficient and safer than loading material onto trucks and then transloading to gondola cars. The rail spur can operate at night when traffic on St. Charles Rock Road is minimal. Please include an assessment of this option.

93.) **Section 6.2.2.4 Reduction of Toxicity, Mobility or Volume through Treatment, page 103** – The first sentence of this section states "None of the alternatives will reduce the toxicity, mobility, or volume of the waste material through treatment technology." If hazardous waste, asbestos, or other wastes are encountered during excavation other than radionuclides, treatment may be necessary reduce toxicity, mobility, or volume. Please elaborate on this issue.

94.) **Section 6.2.2.5.5 Time Until Remedial Action Objectives are Achieved, page 106** – The first sentence is missing the word "all" after "nearly".

95.) **Section 6.2.2.5.5 Time Until Remedial Action Objectives are Achieved, page 106** – The last paragraph of this section describes an "option where the construction schedule is constrained because of a $10 million per year expenditure limitation". The Department does not understand the reason for this constraint or the value used. Please explain why such an expenditure limitation would be required and what can be done to avoid it.

96.) **Section 6.2.2.6.2 Reliability of the Technology, page 108** – This section should include more discussion of other sites that have implemented remedies similar to the off-site disposal alternative proposed in this SFS such as the FUSRAP.

97.) **Section 6.2.2.6.6 Coordination with Other Agencies, page 109** – Coordination with the U.S. Army Corps of Engineers would be beneficial as they have been performing cleanup activities at FUSRAP for numerous years and have a wealth of knowledge and expertise related to radiological cleanups in the St. Louis region.

98.) **Section 6.2.3.2 Compliance with ARARs, page 112** – As stated in a previous comments, the issue of Solid Waste Regulations prohibiting disposal of radioactive wastes in a permitted Solid Waste Landfill needs to be addressed in this section (10 CSR 80-3.010(3)(A)(2)).

99.) **Section 6.2.3.3 Long-Term Effectiveness and Permanence, page 113** – The description of the lined engineered cell needs discussion on the benefit of a bottom liner to prevent leaching to groundwater.

100.) **Section 6.2.3.3.2 Adequacy and reliability of controls, page 114** – This section needs discussion on adequacy and reliability of engineering and institutional controls for the on-site disposal cell.

101.) **Section 6.2.3.5.5 Time Until Remedial Action Objectives Are Achieved, page 117** – The first sentence is missing the word "all" after "nearly".

102.) **Section 6.2.3.5.5 Time Until Remedial Action Objectives Are Achieved, page 118** – Again, the last paragraph of this section describes an "option where the construction schedule is constrained because of a $10 million per year expenditure limitation". The Department does not understand the reason for this constraint or the value used. Please explain why such an expenditure limitation would be required and what can be done to avoid it.

103.) **Section 6.2.3.6.2 Reliability of the Technology, page 119** – This section needs discussion about other sites that have used containment of radiologically contaminated material according to UMTRCA standards. A discussion of the reliability of the technology at these sites would be beneficial.

104.) **Section 6.2.3.6.5 Ability to Obtain Approvals from Other Agencies, page 119-120** – As mentioned in previous comments, the Department does not see the Negative Easement or the FAA Advisory Circular as potential roadblocks to the new alternatives. These are administrative restrictions that can be dealt with accordingly in order to make fair comparisons with the new alternatives and ultimately an informed decision on the remedy for West Lake Landfill.

105.) **Section 7.1.2 Compliance with ARARs, page 123** – The first sentence of the fourth paragraph states, "The 'complete rad removal' with on-site disposal alternative could be designed to meet most but possibly not all of the location-specific ARARs." Please identify those ARARs that will not be met and provide justification for waivers.

106.) **Section 7.1.2 Compliance with ARARs, page 123-124** –The FAA criteria is not an ARAR. Please move this discussion of FAA advisory and the negative easement discussion to the section tilted "Implementability".

107.) **Section 7.2.1 Long-Term Effectiveness and Permanence, page 125** – Please discuss which alternative(s) present the least amount of residual risk.

108.) **Section 7.2.3 Short-Term Effectiveness, page 126** – It should be noted that the 74% chance of a traffic accident for the off site disposal alternative could be reduced to approximately 21% with the selection of rail spur construction and transport.

109.) **Section 7.2.3 Short-Term Effectiveness, page 126** –It should be noted that the risks and doses to workers can be controlled by limiting exposure durations.

110.) **Section 7.2.3 Short-Term Effectiveness, page 128** – The last paragraph on this page again discusses constraining project schedules for $10 million of expenditures per year. It should also be noted that constraining cost could increase the risk to workers and the public.

111.) **Section 7.2.5 Cost, page 130** – The example of the Mound project is exactly why additional characterization of the waste material prior to analyzing alternatives and implementing a remedy is so important.

112.) **Section 7.2.5 Cost, page 130** – The first sentence of the last paragraph states, "Fiscally-constraining the project would not materially affect the cost or schedule for construction of the ROD remedy but would significantly increase (approximately double) the time required for construction of the "complete rad removal" with on-site disposal alternative, and would greatly increase (by a factor of seven to as much as ten) the time required for construction of the 'complete rad removal' with off-site disposal alternative." The Department does not agree with this statement. Constraining the project to $10 million could potentially affect the cost and schedule for the ROD remedy depending on up-front costs. Please consider revising this statement.

113.) **Table 2: Preliminary Identification of Potential Location-Specific ARARs and TBC Criteria** – The construction of a new solid waste disposal area for excavated, non-radioactive waste should comply with all current Solid Waste Rules and Regulations [10 CSR 80-2.015, 10 CSR 80-2.020, and 10 CSR 80-2.030] and [10 CSR 80-3.010] for construction of a new landfill. This rule is intended to provide for sanitary landfill area operations that will have minimal impact on the environment. The rule sets forth

requirements and the method of satisfactory compliance to ensure that the design, construction and operation of sanitary landfills will protect the public health, prevent nuisances and meet applicable environmental standards. This would include the detailed site investigation. Please consider these regulations to be included in this table.

114.) **Table 3: Preliminary Identification of Potential Action-Specific ARARs and TBC Criteria** – The Missouri Solid Waste regulations do not allow disposal of radioactive waste in a Sanitary Landfill [10 CSR 80-3.010(3)(A)1 and 10 CSR 80-3.010(3)(A)2 A thru I]. These rules are intended to provide for sanitary landfill area operations that will have minimal impact on the environment and will protect the public health, prevent nuisances and meet applicable environmental standards. The waste that is excavated to get to the RIM may still have low levels of radioactivity. These rules may be ARAR and should be addressed in this table and document.

In addition, the MDNR regulations do not allow excavation, disruption or removal from active or inactive solid waste disposal areas with out prior approval from the Department [10 CSR 80-2.030(3)(A) thru 10 CSR 80-2.030(3)(G)]. This rule may be ARAR for the removal of waste from the OU-1 area. In particular, 10 CSR 80-2.030(3)(D) requires approval for the location where excavated material is to be deposited. This rule is applicable to the solid waste excavated to get to the radioactive waste. It is referring to other landfills or transfer stations that are approved to accept solid waste, not a storage area to hold waste until able to be put back in the landfill after the radioactive waste is removed. These regulations should be considered in the ARAR selection.

115.) **Table 3: Preliminary Identification of Potential Action-Specific ARARs and TBC Criteria, page 3 of 3-** Please reassess whether the Offsite disposal Waste Acceptance Criteria is an ARAR or a permit requirement of the off-site action.

116.) **Figure 4: Extent of Radiologically Impacted Material** – Please show the radioactive contamination on the Buffer Zone/Crossroad property.

117.) **Figure 12: Environmental Sampler Locations** – Area 1 is labeled as OU2, please correct.

COMMENTS ON APPENDIX F: EVALUATIONS OF POTENTIAL RISKS ASSOCIATED WITH THE ALTERNATIVES:

Appendix F - General Comments:

118.) Overall this appendix could be revised to provide a more comprehensive evaluation of short-term and long-term risks associated with each alternative. The calculations presented in this appendix should be double checked for accuracy.

119.) When assessing risk utilizing the Environmental Protection Agency (EPA) preliminary remedial goals (PRGs) and formula, two formula formats are used; one assuming a half-

life adjustment for the individual radionuclide and one without. RESRAD, on the other hand, utilizes environmental factors in their modeling of dose and risk. The decay constant (λ), should only be used when the exposure media changes in concentration, such as soils that have been adequately characterized. If the media changes due to additions, such as dust deposition to indoor surfaces, use of λ should be carefully considered. In the document, comments below apply to such exposure media and conditions.

120.) If one of the alternatives provided within the SFS is chosen, the Department recommends establishing an appropriate background dataset, and an approach to cleanup that conforms to the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). A final status survey (FSS) approach to ensure the protectiveness of release criterion is recommended. A site-specific risk assessment, which may be performed using the RESidual RADiation (RESRAD) software platform for radionuclides, will be required to verify that cleanup has achieved proper compliance.

121.) A conceptual site exposure model (CSEM) has not been provided for review. Please revise the document to include a CSEM for all potential receptors, on and off site.

Appendix F - Section-Specific Comments:

122.) **Section 3, Incorporation of New Information, page 3** - The review for current toxicity data is limited to the Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) database. IRIS does not include dose conversion factors for radionuclide. An important update to the RESRAD datasets available in Version 6.5 is the International Commission on Radiation Protection (ICRP) 60 dataset. This is a library that utilizes ICRP 60 external dose factors, and ICRP 72 Adult ingestion dose factors and FGR 13 Morbidity risk factors. The Department requests that the ICRP 60 dataset be used for non worker scenarios, and then modified to replace FGR 13 Morbidity with HEAST values. ICRP 60 is being requested in order to utilize the new tissue weighting factors. HEAST is to be used on CERCLA sites, and is more conservative for exposure pathways associated with soils for many radionuclides.

123.) **Table 4-1, Radionuclides of Concern in Soil at the West Lake Landfill, page 5** - The formula (Uranium-238 + Uranium-234)/2] x 0.05) is being used for the indicator radionuclide. Please explain what this formula is attempting to demonstrate.

124.) **Table 4-2, Summary of Chemical Toxicity Screen for Surface Soil, page 6** - Some of the risk-based industrial screening values presented in this table do not correspond to the current regional screening levels (RSLs). For example, the screening value for arsenic is 2.0E+2 milligram per kilogram (2.0E+2 mg/kg), where the carcinogenic RSL is 1.6E+0 mg/kg, and the non-carciongenic (NC) value is 2.6E+2 mg/kg. Given the non-carcinogenic screening value should be factored by 0.1 to adjust for additivity of risk, the NC adjusted RSL is 26 mg/kg. RSLs can be found on the internet using the EPA URL: http://www.epa.gov/reg3hwmd/risk/human/index.htm. Please note that all site-related contaminants, not just previously-identified chemicals of potential concern (COPC), should be compared to the RSLs.

125.) **Section 4.3.3, Toxicity Assessment, page 7** - Toxicity information was provided in the published BRA's toxicity assessment for the radionuclides and chemicals of concern. This information was rechecked against current entries in the IRIS database or risk calculator web sites maintained by EPA. Please provide the result of this evaluation in table format.

126.) **Table 4-3, Radiocarcinogenic Slope Factors, page 7** - The slope factors for uranium-238 (U-238) plus 2 daughters are incorrect. The following applies: Inhalation slope factor, 9.35E-9; ingestion slope factor 5.62E-11; external slope factor 1.14E-7. For radon-222 (Rn-222), an external slope factor of 8.48E-6 for Rn-222 plus daughters applies. Please confirm other slope factors in the table are consistent with EPA's radionuclide tables for adult worker.

127.) **Section 4.3.3.2, Toxins, page 8** - Lead is noted as not having reference dose listed in IRIS. Instead, EPA's Adult Lead Model (ALM) should be utilized for the industrial scenario. EPA's RSLs provide a screening level of 800 mg/kg. If a construction worker scenario is utilized, the ALM should be used for risk assessment purposes.

Please note that the toxicological hierarchy as discussed in the EPA memorandum *Human Health Toxicity Values in Superfund Risk Assessments*, OSWER Directive 9285.7-53 at the internet website http://www.epa.gov/oswer/riskassessment/pdf/hhmemo.pdf must be utilized.

128.) **Table 4-4, Chemical Carcinogenic Slope Factors, page 8** - The inhalation unit risk (URi) for arsenic should be 4.3E-3 (ug/m3)-1, and the dermal slope factor should equal the oral slope factor (SFo) of 1.5E+0 (mg/kg-d)-1, given EPA guidance Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), OSWER 9285.7-02, July 2004, does not recommend adjustment of arsenic's SFo toxicity value for the dermal pathway.

In addition to modification of the toxicity values, the URi, not the SFi, should be utilized. This indicates that the most recent EPA guidance *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual* (*Part F, Supplemental Guidance for Inhalation Risk Assessment*) Final, OSWER 9285.7-82, January 2009 (RAGS Part F), is not being utilized in the exposure assessment of BRA. Refer to RAGS Part F for information on how to assess risk for the inhalation pathway for non-radionuclide. This comment applies to both cancer and non-cancer assessments.

129.) **Table 4-5, Chemical Non-Carcinogenic Reference Doses, page 8** - A reference inhalation concentration (RfCi) of 1.5E-05 for arsenic is provided by California Environmental Protection Agency (CalEPA), a Tier 3 toxicity source.

130.) **Section 4.3.4, Risk Assessment Methods Used, page 9** - When documenting the risk assessment approach, please clearly identify whether risk estimates are for 1) short-term risk during implementation of the remedy, and 2) post-remedial risk assessment.

131.) **Section 4.3.4.1, Risk Assessment Method Used for Exposed RIM in this Study:**

a. The formula provided for estimating risk from exposure to radionuclides is formatted for back calculating to obtain preliminary remedial goals (PRGs). Revise format to forward calculate risk, and utilize 1 picocurie per gram (pCi/g) as the soil concentration. This provides results in risk per pCi/g of soil. This approach should also be utilized in RESRAD, setting the soil concentrations to 1 pCi/g to derive risk.

b. For ingestion and inhalation rates, "iw" is for indoor worker.

c. For the ingestion rate (IR), "IRiw" should be IRAow, which is inhalation rate air, outdoor worker. IRiw, indicating inhalation rate of air, should be IRAow.

d. A table of the exposure factors must be provided.

e. Why utilize a dilution factor (DFi) for an outdoor worker and exposure to ambient air? DF is utilized for consumption of groundwater.

f. Modify the gamma shielding factor to 1.0, instead of multiplying 0.4 by 0.

132.) **Section 4.3.4.1, Risk Assessment Method Used for Exposed RIM in this Study, last paragraph, page 10** – The first sentence of the last paragraph states, "Because these changes to worker exposure times and durations are linear in nature, the risk result will change linearly with changes in concentrations." An example of the changes is presented without providing concrete calculations. This relationship will need to be verified using calculations in the SFS.

133.) **Section 4.3.4.3, Comparison of EPA Web Calculator and RESRAD Results, first paragraph, page 11** – The second sentence of the first paragraph states, "Risks from radon are not addressed separately in the EPA calculator so no direct comparison between the two methodologies could be verified for the radon pathway." Remediation goals are generated for Rn-222 using the EPA calculator for air and soils. In addition, this statement is not accurate. EPA's PRG calculator does estimate risk from exposure to radon, while providing a formula that considers a continual source. For ambient air PRGs and monitoring levels, calculation is straight forward using the EPA calculator. According to EPA, in situations where the contaminant in the air has a continual source (e.g., indoor radon from radium in the soil), the EPA PRG equation which does not include the half-life decay function should be used. Also, both RESRAD and EPA PRG calculator should be used to determine if the UMTRCA cleanup values for radium, including progeny product, are protective of human health. The only limitation is that RESRAD can only be used to determine soil PRGs for radium in soils, the source of radon, and not risk from ambient air concentrations of radon.

134.) **Section 4.3.4.3, Comparison of EPA Web Calculator and RESRAD Results, page 11** - According to this section, exposure pathways from covered radiologically-impacted material (RIM) to receptors on the surface of the landfill are limited to exposure to any

direct radiation or radon-222 that may pass through the cap. If the protectiveness of the remedy is to evaluate exposure to RIM (soil), why exclude ingestion and inhalation pathways? Risk from exposure to soils should be evaluated for exposure to RIM at Uranium Mill Tailings Radiation Control Act (UMTRCA)-based cleanup values for the inhalation, ingestion, and external exposure routes.

135.) **Section 4.3.4.3, Comparison of EPA Web Calculator and RESRAD Results, page 11 -** RESRAD is compared to the Risk Assessment Guidance for Superfund (RAGS) approach for assessing risk. The Summary Report and Health Risk Report generated by RESRAD should be provided in the appendix.

136.) **Section 5.2.3.2, Pathways Selected for Evaluation, last paragraph, page 15 –** This paragraph states, "Covering the RIM with low permeability soil/clay increases the time required for the radon to reach the ground surface. This increased travel-time allows most of the radon to decay before it reaches the surface." Note that radon decay generates daughter products, none of which are gases. Depending on the deposition rate, progeny radionuclide presumably increases in the zones of resistance in the upward migration pathway, as well as grade surface. Discuss this outcome and impact in fate and transport section of the BRA revision.

137.) **Table 5-1, Source Terms in Areas 1 and 2, ROD Remedy (Grade and Cap) Alternative, page 17 –** This table demonstrates radionuclide concentrations at times equals 1 year and 1,000 years for Area 1 and 2. Concentrations of parent radionuclide do not decrease, while associated radionuclide increase. Such is the case for thorium-230 (Th-230) and radium-226 (Ra-226). It is assumed that the parent should decrease due to decay, lending to an increase in the associated radionuclide. Please verify that the parent concentrations are correct for all radionuclides.

138.) **Section 5.3.2, Selection and Description of Maximally-Exposed Individual, page 17 -** The maintenance worker is anticipated to be the receptor receiving the highest exposure. However, exposure to radon on and off site should be discussed in this section.

POTENTIAL ARARS LIST:
The following list of potential applicable or relevant and appropriate requirements (ARARs) was prepared for the new remedial alternatives at the West Lake Landfill Site in addition to those already identified in the Draft Supplemental Feasibility Study (Tables 1 through 3).

Potential ARAR	Description
10 CFR 40, Appendix A, Criteria 6(6)	NRC Regulations - Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content
40 CFR 192	UMTRCA radiation cleanup standards applied to entire landfill
15 U.S.C. 2605	Toxic Substances Control Act
40 CFR 761	PCB regulations
40 CFR 61	NESHAPs standards for asbestos handling
40 CFR 141	National Primary Drinking Water Regulations
10 CSR 80-2.010	Missouri Solid Waste Regulations Definitions
10 CSR 80-2.015	Preliminary Site Investigation, Detailed Site Investigation Workplan, and Detailed Site Investigation and Characterization Report
10 CSR 80-2.020	Permit Issuance, Construction Permits, Operating Permits, Emergency Permits, and Exemptions
10 CSR 80-2.021	Permit Issuance, Special Operating Permits and Permit Exemptions
10 CSR 80-2.030	Solid Waste Disposal Area Closure, Post-Closure Care and Corrective Action Plans and Procedures with Associated Financial Assurance Requirements
10 CSR 80-2.031	Solid Waste Disposal Area Closure and Excavation Procedures
10 CSR 80-3.010	Design and Operation (all)
40 CFR 261, as incorporated by reference in 10 CSR 25-4.261	Identification and Listing of Hazardous Waste
40 CFR Part 262, as incorporated by reference in 10 CSR 25-5.262	Standards Applicable to Generators of Hazardous Waste
40 CFR Part 263, as incorporated by reference in 10 CSR 25-6.263	Standards Applicable to Transporters of Hazardous Waste
40 CFR Part 264 Subpart F, as incorporated by reference in 10 CSR 25-7.264(2)(F)	Releases from Solid Waste Management Units (i.e. monitoring and management of contaminated groundwater)
40 CFR Part 264 Subpart G, as incorporated in 10 CSR 25-7.264(2)(G)	Closure and post-closure care of all hazardous waste management facilities

40 CFR Part 264 Subpart I, as incorporated by reference in 10 CSR 25-7.264(2)(I)	Use and Management of Containers
40 CFR Part 264 Subpart N, as incorporated by reference in 10 CSR 25-7.264(2)(N)	Land disposal and/or capping of past disposal areas
40 CFR Part 264 Subpart CC, as incorporated by reference in 10 CSR 25-7.264(1), and the additional state requirements found at 10 CSR 25-7.264(2)(CC)	Air Emission Standards for Tanks, Surface Impoundments, and Containers
40 CFR Part 268, as incorporated by reference in 10 CSR 25-7.268(1)	Land Disposal Restrictions
40 CFR 264.554, as incorporated by reference in 10 CSR 25-7.264	Staging Piles
40 CFR 50	National Ambient Air Quality Standards (NAAQS)
10 CSR 10-3	Air Pollution Control Rules Specific to the Outstate Missouri Area
10 CSR 10-5.160	Control of Odors in the Ambient Air
10 CSR 10-6	Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri
10 CSR 10-6.010	Ambient Air Quality Standards
10 CSR 10-6.020(3)(A)	Table 1-*De Minimis* Emission Levels
10 CSR 10-6.030	Sampling Methods for Air Pollution Sources
10 CSR 10-6.060(12)(J)	Air Quality Analysis for Hazardous Air Pollutants
10 CSR 10-6.130	Controlling Emissions During Episodes of High Air Pollution Potential
10 CSR 10-6.170	Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin
640.100 – 640.140, RSMo.	Safe Drinking Water Law
643.010 – 643.620, RSMo.	Missouri Air Conservation Law
644.006 – 644.141, RSMo.	Missouri Clean Water Law
40 CFR 122	National Pollutant Discharge Elimination System (NPDES)
40 CFR 131	Water Quality Standards
10 CSR 20-2	Missouri Clean Water Commission Definitions
10 CSR 20-7	Water Quality
10 CSR 20-6.200	Missouri Storm Water Regulations
10 CSR 20-7.015	Effluent Regulations
10 CSR 20-7.031	Water Quality Standards

42 U.S. Code 10171, Sec. 151	Nuclear Waste Police Act of 1982, Subtitle D – Low-Level Radioactive Waste; Financial Arrangements for Low-Level Radioactive Waste Site Closure