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# NATURAL RESOURCES

Eric R. Greitens, Governor

Carol S. Comer, Director

October 10, 2017

Ms. Christine Jump, Project Manager  
Superfund Division  
United States Environmental Protection Agency, Region 7  
11201 Renner Boulevard  
Lenexa, Kansas 66219

RE: Comments on draft Final Feasibility Study (FFS), West Lake Landfill, Operable Unit 1,  
dated August 25, 2017

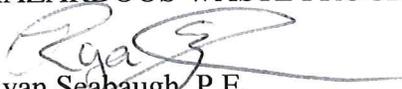
Dear Ms. Jump:

The Missouri Department of Natural Resources' Federal Facilities Section has performed a concise review of the draft document referenced above. This draft FFS is still considered preliminary due to the incomplete remedial investigation addendum (RIA) report, incomplete baseline risk assessment, incomplete RIM characterization model, missing portions of the FFS such as the industrial land use alternative, and reliance on additional draft documents such as the draft radon flux analysis to support conclusions. However, consistent with previous EPA requests, we have proposed language in order to expedite resolution of specific comments generated during our review. We note that for a concise review, a substantial number of comments have been generated for concepts that were either fully or partially presented in the prior draft document. Given the rate of improvement between the first two drafts, there is concern whether this document will be available in draft final form with enough time to provide adequate review when all concepts are fully presented in the feasibility study.

Thank you for the opportunity to provide comments on this preliminary draft Final Feasibility Study. If you have any questions pertaining to these comments please contact me by phone at (573) 751-8628, or by written correspondence at P.O. Box 176, Jefferson City, MO 65102.

Sincerely,

HAZARDOUS WASTE PROGRAM

  
Ryan Seabaugh, P.E.  
Federal Facilities Section

RS:rl

Enclosure:

c: Tom Mahler, EPA Region 7

# **Second Draft Final Feasibility Study dated August 25, 2017**

**West Lake Landfill Operable Unit 1**

**October 10, 2017**

## **Draft comments**

### **General Comments:**

- GC-1. In many cases, especially when discussing cover alternatives, this document moves significantly into remedial design, and does not caveat or clearly qualify the “design” as being conceptual for cost comparison purposes.

Comment: Clearly state that any designs presented in this study are conceptual and for cost comparison purposes only, then delete portions of conceptual designs that are not.

- GC-2 The Feasibility study puts too much emphasis on current conditions and rarely discusses scenarios as it relates to potential ARARs extending 200-1000 years out, or protection of health through the entirety of the period when risk exceeds threshold values (greater than 9,000 years to maximum risk, then slowly declining beyond then)

Comment: Provide discussion of alternatives in appropriate time frames for threshold criteria.

- GC-3 The presence or level of detail when discussing ARARs in section 3 is inconsistent.

Comment: Consistently and adequately discuss all ARARs presented in ARAR tables in addition to any others that may be added or identified.

- GC-4 Due to review-time constraints, back checking accuracy or logic of prior Feasibility study conclusions that fail to utilize new information or updated risk assessment is beyond the scope of this review. Based on past reviews, we are concerned that prior documents are not referred to appropriately.

Comment: Correct and modify statements referring to previous feasibility studies and remedial investigation documents. Additionally, adjust the FFS approach to create a document that incorporates and is independent of all previous versions of the feasibility study as required by EPA’s statement of work.

- GC-5 Due to review-time constraints, conclusions in this document that are derived or referred from unfinalized, unreviewed, and non-public documents are excluded from the review. Based on past reviews, we are concerned that these types of documents are not developed or referred to appropriately. All reports used or referred to in this FFS should be appropriately finalized and included in the Administrative Record to allow public access.

Comment GC5-1: Correct and modify statements referring to unfinalized, unreviewed, or non-public documents. Additionally, adjust the FFS approach to create a document that incorporates and is independent of all previous versions of the feasibility study as required by EPA's statement of work.

CommentGC5-2: If documents that are heavily referenced and relied on in this FFS have been finalized, please provide copies to MoDNR and make them publically available.

GC-6 Due to review-time constraints, cost analysis is not included in the review.

Comment: There has been significant added language that discusses considerable "uncertainty" in characterizing the extent of contamination and the subsequent volume calculations made for excavation alternatives. This seems to contradict statements in supporting documents that describe the investigation as "extensive." Please note that the goal for cost analysis for alternatives is to be within the range of +50%/-30% accuracy for final cost.

### **Executive Summary**

1. Executive Summary, General:

Comment: Revise the summary to ensure consistency with the conceptual site model and all resolved comments from the remedial investigation addendum.

2. Executive Summary ES-1, first paragraph:

*"This FFS was prepared in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), relevant EPA guidance documents (including, but not limited to, EPA's 1988 Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA), EPA's December 9, 2015 Statement of Work (SOW) for the Remedial Investigation Addendum (RI Addendum) and FFS, and the May 6, 2016 Abbreviated Work Plan for the RI Addendum and FFS."*

Comment: Add "and EPA's clarification letter dated August 4, 2016" to the end of the last sentence.

3. Executive Summary ES-1, second paragraph:

*"The Site is a 200-acre, inactive solid waste disposal facility that accepted wastes for on-site landfilling from approximately the 1950s through 2005."*

Comment: Delete "solid" from the first sentence, and apply globally when referencing the entire site or portions of the site where permit requirements or other valid documentation does not exclusively support, the descriptor.

4. Executive Summary ES-1, third paragraph:

*“RIM at the Site consists of soils containing radium and thorium isotopes intermixed with and interspersed within an overall matrix of municipal solid waste (MSW) and non-radionuclide bearing soil in portions of two areas of the West Lake Landfill.”*

Comment 4-1: Replace this statement with “Radiological Material historically brought to the Site consists of Uranium, Radium, and Thorium isotopes and their daughter products, some of which are out of secular equilibrium. In some cases the material may have been mixed and interspersed with additional fill material, municipal solid waste (MSW), demolition debris, and other waste as a result of landfilling operations. For purposes of this Site, the radiological material in addition to any other material that may have been impacted has been defined as Radiologically Impacted Material (RIM), and is identified by the presence of Thorium, Radium, and Uranium above site-specific threshold values.”

Comment 4-2: Replace “RIM” with “radiological material”, and apply globally where RIM is not being discussed by its definition.

5. Executive Summary ES-1, third paragraph:

*“RIM at the Site consists of soils containing radium and thorium isotopes intermixed with and interspersed within an overall matrix of municipal solid waste (MSW) and non-radionuclide bearing soil in portions of two areas of the West Lake Landfill.”*

Comment: When discussing waste in general terms, and where co-location exclusively with municipal solid waste has not been substantiated, globally replace “municipal solid waste” with “waste materials”.

6. ES-5, first bullet:

*“The short-term risks to on-site workers associated with the full excavation alternative and partial excavation alternatives are projected to exceed EPA’s acceptable risk range.”*

Comment: For consistency with all bullets discussing short-term risks to onsite workers, add the sentence “However, a properly designed health and safety program can be implemented such that no unacceptable exposures are anticipated.” Please note, excavation remedies for similar material is being successfully implemented around the St. Louis area to limit short-term exposure below unacceptable risk. Please consult with federal respondent on addressing short term risks.

7. ES-5, third bullet:

*“All of the excavation alternatives are expected to result in radiation doses to workers above the limits established by OSHA and NRC.”*

Comment: For consistency with all bullets discussing short-term risks to onsite workers, add the sentence “However, a properly designed health and safety program can be implemented such that no unacceptable exposures are anticipated.”

8. ES-5, fourth bullet:

*“All of the alternatives are expected to result in measurable, short-term impacts to plants or animals as a result of removal of existing habitat.”*

Comment: Please note in the bullet that much of the habitat has already been removed under the NCC work.

### **Section 1**

9. Section 1 Introduction, page 20:

*“In accordance with the EPA SOW, the OU-1 Respondents prepared an Abbreviated Work Plan for a Remedial Investigation Addendum and Final Feasibility Study (RI Addendum/FFS Work Plan) (EMSI, 2016a) that was approved by EPA on May 18, 2016 (EPA, 2016a). On behalf of the OU-1 Respondents, Engineering Management Support, Inc. (EMSI) has prepared this FFS to address the requirements set forth in the EPA SOW as further described in the RI Addendum/FFS Work Plan.”*

Comment: Insert “conditionally” prior to “approved by EPA on May 18, 2016”, and add reference to the additional EPA letter dated August 4, 2016.

10. Section 1.1 Background, page 20:

*“OU-1 also includes a 1.78-acre parcel of land adjacent to Area 2 known as the Buffer Zone. Although the Buffer Zone has never been used for landfilling, RIM has been documented to be present on this parcel of land as well.”*

Comment: Include all adjacent properties that are impacted.

11. Section 1.1, Background, page 21:

*“In accordance with a 1993 Administrative Order on Consent (AOC) (EPA, 1993a), and over the period from 1994 to 2008, the OU-1 Respondents conducted numerous Site investigations that included the collection and analysis of waste/soil samples and monitoring of the quality of surface water, sediment, groundwater and air at the Site.”*

Comment: Globally delete subjective terms such as “numerous”

12. Section 1.2, ROD-Selected Remedy, page 24:

*“however, it should be noted that subsequent evaluations by the Federal Emergency Management Agency (FEMA) have determined that landfilled materials contained within Areas 1 and 2 are located outside of the Missouri River floodplain.”*

Comment: Cite a specific FEMA study or evaluation that states landfilled materials contained within Areas 1 and 2 of West Lake Landfill are located outside of the Missouri River floodplain, or revise the statement to be accurate and consistent with all available information.

13. Section 1.4.2.2 Other Additional Evaluations, page 28:

*“Discussion and consideration of the occurrence of an exothermic subsurface reaction (SSR)<sup>3</sup> and evaluation of an Isolation Barrier (IB), including a brief discussion of pending/ongoing IB-related design and field work;”*

Comment: Globally replace “SSR” with “SSE” and delete footnote 3.

14. Section 1.5 FFS Approach, page 32:

*“Where necessary for the evaluation of the alternatives, or as otherwise appropriate for completion of the FFS, brief summaries or tabulations of the results of prior Site evaluations are provided; however, the prior reports should be reviewed or consulted for additional details and specific information relative to those evaluations.”*

Comment: Based on EPA’s statement of work, the FFS is supposed to be a comprehensive document that incorporates and updates prior feasibility studies. The Final Feasibility Study should incorporate previous studies as necessary to be a stand-alone document where extensive research into previous documents are not necessary to understand relevant details and how they are supported.

## **Section 2**

15. Section 2.1.2. Superfund Operable Units, page 37:

*“The Closed Demolition Landfill and the Bridgeton Landfill, while designated as part of OU-2, are regulated by the MDNR pursuant to State of Missouri solid waste regulations and are not being actively addressed by EPA.”*

Comment: Delete the statement and replace with “Regulatory authority for the Closed Demolition Landfill and the Bridgeton Landfill has been deferred to MoDNR per the selected remedy under the OU-2 Record of Decision.”

16. Section 2.1.4., Site Zoning, Use Restrictions, and Easements, page 39:

*“In particular, the proximity of the airport to the Site presents a risk of bird strikes. Certain types of scavenging birds (e.g., gulls, crows) are attracted to exposed putrescible wastes at landfills, and accordingly can present a bird strike risk to passing aircraft. Similarly, bird flocks also pose a serious risk to aircraft (by, e.g., being sucked into the jet engines of commercial aircraft, thereby causing complete engine failure).”*

Comment: The last two sentences of this statement are extraneous and sensational. Delete the last two sentences.

17. Section 2.1.4., Site Zoning, Use Restrictions, and Easements, page 39:

*“...such that with the exception of the stormwater retention basin and the soil borrow and stockpile area (Figure 2-3), the majority of the landfill property, including the waste deposits in Areas 1 and 2, is now located above and outside of the 500-year floodplain of the Missouri River (Figure 2-9)”*

Comment: Add “surface of the” before “landfill property” and delete “, including the waste deposits in Areas 1 and 2,”

18. Section 2.1.6., Missouri River Floodplain, page 39:

*“The topography of the Site area has been significantly altered by quarry activities and by placement of quarry spoils and landfill materials. Consequently, although portions of the Site were built over the historic (geomorphic) floodplain, landfilling activities have significantly increased the topographic elevation of much of the Site (Figure 2-4) such that with the exception of the stormwater retention basin and the soil borrow and stockpile area (Figure 2-3), the majority of the landfill property, including the waste deposits in Areas 1 and 2, is now located above and outside of the 500-year floodplain of the Missouri River (Figure 2-9).<sup>4</sup> The Buffer Zone and Lot 2A2 are located on the Missouri River floodplain within the area protected by the Earth City Flood Control district levee system from a 0.2% chance of flooding”*

EPA comment #27 stated:

*“Section 2.1.6, Page 17, Second paragraph – The concerns with flooding are potentially two-fold: 1) erosion of the cap or cover of the landfill and subsequent exposure of radionuclides and waste, and 2) increased potential for leaching. The topographic land surface of the landfill has been raised over time. Now the majority of it lies above the 500-year flood zone, and significant erosion due to flooding is not*

*anticipated which addresses concern number 1. However, the elevation of the waste and RIM in the landfill has not changed, and flooding could increase the potential for leaching. Add discussion to this section acknowledging this potential for flooding to impact the potential for the RIM to leach under flooding conditions. Also, revise the last sentence of the second paragraph to accurately reflect the information on Figure 2-9, which indicates that the buffer zone vicinity and the north east side of both Area 1 and Area 2 are within the 0.2% annual chance of flooding on the Missouri River Floodplain. Revise the footnote to remove the 0.2% caveat.”*

The respondents responded:

*“No change has been made. Per subsequent discussions with EPA, it was agreed that flooding would not increase leaching of RIM as flood waters will not elevate the groundwater level into the RIM.”*

Comment: The validity of this response is questionable due to the respondents’ own models and sample analysis suggesting RIM is located so far down as to be present in native alluvial material within the Missouri River Floodplain. (Examples Table 6-4 Borehole 5-3, Figure M-1.4 Cross-Section D-D’ Area 1, and Figure M-2.1b Cross-Section A-A’ Area 2: draft RI dated June 16, 2017) Adequately develop and appropriately utilize a conceptual site model based on accurate facts to support these statements.

19. Section 2.2 Nature and Extent of Radionuclide and Chemical Occurrences in OU-1, page 40:

*“...The occurrence, distribution and volume of RIM in Areas 1 and 2 has been the subject of extensive field investigations, sampling and laboratory analyses, and engineering evaluations, as summarized in...”*

Comment: Globally delete “extensive” and all other subjective terms.

20. Section 2.2.2. Source of Radionuclides, page 41:

*“The radiologically-impacted materials within Areas 1 and 2 are intermixed with decomposed MSW within portions of the overall matrix of landfilled solid waste materials, debris and fill materials, and unimpacted soil and quarry spoils in portions of Area 1 and Area 2.”*

Comment: Replace “The radiologically-impacted materials” with “Radiological material”. Apply globally where not discussing RIM by its definition.

21. Section 2.2.1 Occurrences of Radionuclides in Areas 1 and 2, page 40 and Section 2.2.2 Source of Radionuclides, page 41:

*“...the RIM was found in surface soil believed to have been carried by erosion from the Area 2 berm”*

and

*“In light of the standard MSW operating procedures at that time, it is assumed that the soil mixed with LBSR was most likely used as landfill cover material”*

Comment: Use of words such as “believe” and “assumed” does not lend much credibility to previous statements using the words “extensively” and “numerous” when describing investigative effort. Adequately develop and appropriately utilize a conceptual site model to form a supportive basis for conclusionary statements.

22. Section 2.2.2, Source of the Radionuclides, page 41 and 42:

*“The radiologically-impacted materials within Areas 1 and 2 are intermixed with decomposed MSW within portions of the overall matrix of landfilled solid waste materials, debris and fill materials, and unimpacted soil and quarry spoils in portions of Area 1 and Area 2. According to a report prepared by the NRC, “The manner of placing the 43,000 tons of [soil mixed with LBSR] in the landfill caused it to be mixed with additional soil and other material so that now an appreciably larger amount is involved.” (NRC, 1988). In light of the standard MSW operating procedures at that time, it is assumed that the soil mixed with LBSR was most likely used as landfill cover material. Operation of MSW landfills requires placement of soil cover over exposed waste at the end of each day; soil is placed over the compacted but still irregular, nonuniform surface of the disposed waste, resulting in a relatively discontinuous layer of variable thickness. Furthermore, the surface of an active landfill is not flat, but rather is sloped to allow for better compaction of the waste material. Consequently, soil cover material placed over waste materials in an MSW landfill is not a discrete definable layer even when it is initially placed, but rather consists of small areas of irregular sloping surfaces of variable soil thickness. The initial discontinuous nature of the soil cover material is further disrupted during the placement and compaction of additional MSW and other soil material over the top of and adjacent to previously placed waste materials.”*

Comment: Replace this section with verbiage identical to an approved RI Addendum summary.

23. Section 2.2.5, Estimated Volume of RIM and overburden material, all (including subsequent sections):

Comment: Comments were made on the geostatistical model in the RI that form the basis for estimated volumes. Due to time constraints, any potential revisions made in Appendix B of this FFS submittal based on the RI comments were not reviewed. Appendix B and resulting discussion in this report will be evaluated separately and provided in a separate submittal.

24. Section 2.2.5, Estimated Volume of RIM and overburden material, page 45:

*“The data available to estimate the extent of RIM include concentrations of thorium and radium obtained from laboratory analysis of landfill materials, plus a large number of vertically piecewise-continuous gamma and alpha recordings obtained within boreholes or by scanning retrieved core material.”*

Comment: Replace “landfill materials” with “surface and subsurface samples”

25. Section 2.2.5 Estimated Extent and Volume of RIM and Overburden Material, page 46

*“However, as described by SSP&A (2017), there is significant uncertainty associated with the estimated extent and volume of RIM in Areas 1 and 2. Specifically, SSPA indicated that these estimates are likely biased low and therefore underestimate the actual volume of RIM in Areas 1 and 2.”*

Comment: Due to the uncertainty of the input parameters of the geostatistical model, the inability to replicate the results due to insufficient presentation of how the model came up with the results, and other factors such as the conceptual site model commented on in the draft RIA, there is insufficient evidence presented to support statements that indicate the overall direction of bias. Delete any reference to “low bias” when discussing the estimated volume of RIM until the statement can be factually supported.

26. Section 2.2.6 Distribution of RIM, page 47:

Comment: None of the conclusionary statements in this section is based on factual information or supported by the conceptual site model. Replace the section with identical verbiage from an approved RI Addendum summary.

27. EPA comment #36:

*“Sections 2.2.6, General comment— Appendix B provides details on the significant geostatistical effort to estimate the volume of RIM. There are numerous references in Appendix B noting that these estimates are likely to be biased low, and there are significant assumptions and limitations in these calculations. However, none of the sections in the main text of the FFS make note of these limitations. Please qualify the discussion of RIM material in this section with the limitations and/or cautions noted in Appendix B. This*

*comment also applies to Sections 5.4.1, 5.5.1, 5.6.1, and any other pertinent sections.”*

Comment: While we agree that assumptions and limitations of calculations should be clearly stated, the information presented in the report does not support the statement that overall, “estimates are likely to be biased low”, and do not concur with the portion of the comment requiring inclusion of this statement without first being supported.

28. EPA comment #37:

*“The volume of RIM located on the former Ford Property represents a conservative estimate of the volume of RIM potentially located on the Buffer Zone/Crossroads property. Expand this discussion to include the likelihood for this to be an overestimate of the volume of RIM present at this portion of the Site and any other uncertainties.”*

Comment: Neither the conceptual site model nor the presentation of data in the RIA support inclusion into the discussion for “the likelihood for this to be an overestimate of the volume of RIM present at this portion of the Site” as it applies to the limited characterization of the Buffer Zone. We do not concur with the comment requiring inclusion of this statement without first being supported.

29. Footnote 8, page 54:

*“Radon flux was measured rather than concentration because no structures are present in either Area 1 or Area 2 that would result in the buildup of radon concentrations. Instead, the potential transport pathway is the migration of the gas from the Site to the atmosphere.”*

Comment: There is one structure remaining inside Area 2, and two structures immediately adjacent to Area 1. Modify the footnote to be accurate or delete.

30. Section 2.4, Radionuclides in Stormwater, Surface Water and Sediment, page 56:

*“All of these actions would serve to greatly reduce and, ultimately, likely eliminate the potential for radionuclide transport in surface water. This conclusion is supported by results of the recent stormwater monitoring activities (discussed below) conducted in conjunction with installation of the non-combustible cover.”*

Comment: Not supported by data, and NCC should not be used for future baseline risk. Replace entire statement with “These actions were implemented to mitigate current risk from potential radionuclide transport in surface water.”

31. Section 2.4 Radionuclides in Stormwater, Surface Water and Sediment, page 57:

*“Review of the rainwater runoff results indicates that radium levels above the drinking water standard were only present in the sample from Weir 9. Specifically, the Ra-226 level detected in the unfiltered sample obtained in April 1996 from this location was 8.85 pCi/L compared to the drinking water standard of 5 pCi/L. Subsequent sampling of rainwater runoff from this location in May 1997 indicated that the combined Ra-226 (0.32 pCi/L) and Ra-228 (<0.87 pCi/L) did not exceed or even come close to the drinking water standard of 5 pCi/L.”*

Comment: Explain why results are compared to MCLs. (e.g. PRGs)

32. Section 2.4 Radionuclides in Stormwater, Surface Water and Sediment, page 57: *“Stormwater monitoring has been performed at up to 11 locations (Figure 2-17) including the following:”*

Comment: Include the date range that each location has been subject to sampling.

33. Section 2.4 Radionuclides in Stormwater, Surface Water and Sediment, page 58:

*“The results of the laboratory analyses for radionuclides are summarized on Table 2-17. Results of analyses for physical and chemical parameters are summarized on Table 2-18. The reported activity concentrations of combined Ra-226 plus Ra-228 for all of the stormwater samples have all been less than the radium drinking water standard of 5 pCi/L. Total uranium results for nearly all of the stormwater samples were less than the 30 ug/L MCL for drinking water supplies (Table 2-17). The only exception was the sample of ponded water on the Buffer Zone obtained on April 30, 2017 from location OU-1-010 which contained approximately 60 ug/L of total uranium (Table 2-17), which was twice the drinking water standard.”*

Comment: Include discussion on results for Gross Alpha, and compare to standards.

34. Footnote 10, page 58:

*“The North Surface Water Body is currently located partially onsite and partially on offsite property owned by STL Properties LLC (the former Emerson Electric property), and its composition has changed over time. During the initial RI investigations, the North Surface Water Body was located primarily onsite. Subsequently, the portion that is located on the Site became overgrown and silted and is now primarily swamp, except during periods of rainfall, when water ponds in this area.”*

Comment: Where did the silt come from, and has it been sampled appropriately for the time period that *“Runoff from the southeastern portion of Area 2 flows to the northeast where it enters the Northeast Perimeter Drainage Ditch and subsequently flows into the North Surface Water Body.”*

and

*“All runoff from Area 1 ultimately flows into the perimeter drainage ditch located along the northeast side of the landfill adjacent to St. Charles Rock Road (the Northeast Perimeter Drainage Ditch), which then flows into the surface water body located north of Area 2 (the North Surface Water Body).”*

Discuss how and when this area will get characterized.

35. Footnote 11, page 58:

*“Based on topographic conditions, it does not appear that runoff from Areas 1 or 2 could enter the Flood Control Channel.”*

Comment: RI detail and extraneous, delete.

36. Section 2.5 Groundwater Conditions, entire section:

Comment: Comments made on groundwater discussions in the second draft RIA are applicable to the FS.

37. Section 2.6 Baseline Risk Assessment, entire section:

Comment: The validity of conclusions stated in this section cannot be reviewed due to the draft nature of underlying Baseline Risk Assessment in the RIA.

38. Section 2.6.3 BRA Summary and Conclusions, page 71:

*“These future risks hypothetically assume that the Landfill will not have a cover and no remediation will occur, which is inconsistent with state and federal regulations, and results in a conservative estimate of risk.”*

Comment: These assumptions were made to establish baseline risk, not to conservatively estimate risk.

### **Section 3**

39. General Section 3:

Comment 39-1: This section is not consistent in how it discusses ARARS. Some potential ARARS are not discussed, while some identified as not ARARS may or may not be discussed, while some topics that are categorized as not ARAR and not TBC are given over four pages of discussion.

Comment 39-2: Discuss all potential ARARs appropriately and consistently.

40. Section 3.1.2.1 Floodplain Management, general:

Comment: Provide an introductory discussion that recognizes all conclusions and statements in this subsection describe current conditions. Then discuss the time period in which some remedies may need to be designed in order to meet certain ARARs or be protective of human health, and address the uncertainty involved with possible conditions far into the future. For example, acknowledging the fact that the river may move within its geomorphic flood plain during the time period where toxicity of the remaining RIM peaks. Finally, state that long-term uncertainties such as these will be evaluated for each alternative.

41. Section 3.1.2.1 Floodplain Management, page 87:

*“The Buffer Zone and Crossroads Property are located within the historic floodplain of the Missouri River.”*

Comment: Replace the statement with “All of OU-1 is located within the geomorphic floodplain of the Missouri River.”

42. Section 3.1.2.1 Floodplain Management, page 87:

*“As discussed in Section 2.1.6 and shown on Figure 2-9, other than the OU-2 stormwater retention basin and on-site soil borrow and stockpile area, the entire West Lake Landfill site (including all of the disposal areas) is outside the 0.2-percent annual chance (500-year) floodplain.”*

Comment: This statement is not supported by data or Figure 2-9. Revise the statement to be accurate.

43. Section 3.1.2.1 Floodplain Management, page 87:

*“Because the Site is located outside of the 0.2-percent annual chance (500-year) floodplain, no mitigative actions...”*

Comment: This statement is not supported by data or facts. Revise the statement to be accurate.

44. Section 3.1.2.1 Floodplain Management, page 88:

*“In the event of a failure of the Earth City Levee system (which provides protection from flood events with a recurrence interval greater than 500 years), floodwaters could reach the Buffer Zone and Crossroads Lot 2A2 Property<sup>16</sup>.”*

Comment: Replace “reach” with “inundate” and delete the footnote.

45. Section 3.1.2.1 Floodplain Management, page 88:

*“Due to the distance from the river, such floodwaters would not be expected to be high energy, but instead would be nearly stagnant and without the velocity and energy capable of resulting in significant erosion of these areas.”*

Comment: Add “current” after “Due to the”, and add “in the near term” after “high energy”

46. Section 3.1.2.1. Floodplain Management, footnote 16, page 88:

<sup>16</sup> It is expected that any radiologically-impacted soil that may remain on these properties would be removed as part of the implementation of any remedial action taken for OU-1.”

Comment: Delete footnote 16

47. Section 3.1.2.4. Missouri Solid Waste Management Regulations – Seismic Impact Zones, page 89:

*“Extensive geologic mapping of the quarry walls in the area of the inactive Bridgeton Sanitary Landfill did not identify the presence of any faults in that area.”*

Comment: Cite the document that discusses “extensive geologic mapping of the quarry walls” or delete.

48. Section 3.1.2.8. FAA Guidance, page 91: This section contains extraneous information that the PRPs identified as not relevant to ARAR or TBC criteria.

Comment: Unless considered a TBC, at a minimum, delete: “In its Lambert Airport ROD (Appendix A), the FAA noted that the end of the proposed runway would be located within 10,000 feet of a then-existing active landfill (the Bridgeton Landfill) and therefore would not be consistent with FAA’s current runway siting guidelines without mitigation. The decision document indicated that at its closest point, the Bridgeton Landfill is located approximately 9,166 feet west of the northwest end of proposed Runway 12W/30W.

This is not consistent with FAA’s runway siting guideline of 10,000 feet, which was developed to protect aircraft from potential bird strikes.

The FAA decision document states:

‘STLAA will attempt to develop an agreement with the operator of the landfill to implement one of the following options:

- Re-prioritize the landfill utilization plan so that the subject portion (i.e., that portion within the FAA’s 10,000-foot radius of incompatibility) of the landfill is utilized first;
- Require that STLAA be able to direct available fill that cannot be reasonably recycled from the construction projects to the subject portions of the landfill;
- Require that organic waste be capped in the landfill before the new runway is opened and that only clean fill (such as construction materials) be placed in the subject portions of the landfill once the runway is operational.

Should it not be practical to completely fill the subject landfill through the above measures, the STLAA will purchase an easement from the landfill operator which will provide the operator

compensation for any lost revenue associated with the unused excess capacity. Any plan to convert or close the landfill must provide for a one-year bird-repelling program. Repelling efforts will begin 6 months before opening of the new runway and continue for a minimum of 6 months thereafter. The program will be in effect from dawn until dusk.'

(FAA ROD, September 30, 1998, pp 42 – 43).

Pursuant to an agreement between Bridgeton Landfill, LLC and the City of St. Louis (among other parties) on behalf of the STLAA, the Bridgeton Landfill ceased accepting waste materials prior to the opening of Runway 11/29."

49. EPA Comment #77:

*"This paragraph states the St. Louis Lambert Airport Authority (STLAA) has indicated any excavation alternative **will** [emphasis added] violate the Federal Aviation Administration (FAA) ROD and the Restrictive Covenant. Per page 181 of Appendix A, The City of St. Louis, Missouri Negative Easement and Declaration of Restrictive Covenants Agreement, #4: 'The term of this Agreement shall begin on the Effective Date and shall end only if and when St. Louis choses in its sole and absolute discretion to abandon its negative easement granted herein by terminating or canceling the Agreement in writing and recording such writing with St. Louis County's Recorder of Deeds.' Since the excavation alternatives are dependent upon removing soils and waste from areas 1 and 2 and replacing the non-RIM waste in the landfill, please include a description of the most recent discussions, communications, or agreements between Bridgeton Landfill, LLC and the city of St. Louis regarding bird mitigation efforts that will need to be considered in evaluating the implementability of the excavation alternatives."*

Comment 49-1: Based on review of the documents provided in the appendix, the basic premise that "any excavation alternative will violate the Federal Aviation Administration (FAA) ROD and the Restrictive Covenant" is contextually suspect, highly interpretive, and questionable in its validity. The context of the quoted portion of the FAA letter dated September 20, 2010 letter appears to refer to a non-specific work plan describing an on-site engineered disposal cell. Indeed, much of the letter appears to be written in the context of construction of a new disposal cell. In addition, later portions of that same letter appears to backtrack on EPA's cited statement first by stating that "*The FAA considers any facility handling uncovered quantities of municipal solid waste outside, even if only for a short time, incompatible with safe airport operations **if they are located within a 10,000 foot radius of an active airport runway** [emphasis added]" The letter continues by referencing an FAA Advisory Circular (150/5200 33B) that:*

- Is not requirement or ARAR;
- Is not applicable to modifications or expansions of an existing MSWLF;

- Recommends against “*handling or storing putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA’s definition of fully enclosed trash transfer stations. The FAA considers these facilities incompatible with safe airport operations if they are located closer than the separations distances specified in Sections 1-2 through 1-4.*”

Of note here is the transfer station that is incompatible with FAA criteria continuously operating on site with fresh new putrescible waste in equal or closer proximity to Area 1 and 2, which largely contains wastes ranging from 26 (permit #118906) to 65 years old; and

- “*Strongly recommends that off-airport storm water management systems located within the separations identified ... be **designed and operated so as not to create above ground standing water** [emphasis added]. Stormwater detention ponds should be designed, engineered, constructed and maintained for a maximum 48-hour detention period...*”

The letter then continues to backtrack by stating “*...the presence of uncovered municipal solid waste at the West Lake Landfill **may** [emphasis added] place the City in violation of 1998 ROD.*”

Further, Requirement #1 of the NEA states “There shall be no new or additional depositing or dumping of municipal waste, organic waste, and/or putrescible waste...” The waste currently contained on property (except for fresh new waste deposited daily at the transfer station) is neither new nor additive.

Comment 49-2:

*“Since the excavation alternatives are dependent upon removing soils and waste from areas 1 and 2 and replacing the non-RIM waste in the landfill, please include a description of the most recent discussions, communications, or agreements between Bridgeton Landfill, LLC and the city of St. Louis regarding bird mitigation efforts that will need to be considered in evaluating the implementability of the excavation alternatives.”*

This comment that supports addition of private meetings and requires comment letters of one specific stakeholder is not consistent. If EPA is requesting comments and comment letters from individual stakeholders into this discussion, also include all stakeholder comment letters related to the RI, FS, and any other relevant investigation or work plan and include as appropriate in Appendix A (including the August 11, 2014 letter in Appendix A that was referenced in response to EPA comment 77). Discussion should also include the USDA letter dated September 17, 2010. Finally, bird mitigation will apply to any remedial alternative that includes re-grading, re-contouring,

excavation, and any other action relating to exposing and moving waste. Bird mitigation considerations should not be limited to “the excavation alternatives”

50. Section 3.1.2.9 Airport Negative Easement and Restrictive Covenants, page 94:

*“On September 7, 2010, representatives of Bridgeton Landfill, LLC and the EPA met with representatives of the St. Louis Airport Authority and the U.S. Department of Agriculture to follow up on concerns raised that the Restrictive Covenant entered into between landfill owners and STLAA would prohibit construction of the “on-site cell” evaluated as part of the SFS. The EPA provided a summary of the alternatives considered in the SFS. STLAA and USDA stated that an excavation remedy would create risks that they could not even calculate, and that monitoring and management of risks created by wildlife would be impossible. STLAA noted that under the ROD-selected remedy, the Site will present no risk to human health or the environment and said that creating new risks by implementing an excavation remedy did not seem advisable. STLAA further stated that an excavation remedy would necessitate FAA review and likely result in objections from airlines as well as the FAA. STLAA was particularly concerned that either excavation alternative would take years to perform.*

*The EPA asked whether the airport's concerns would be alleviated by excavation of only Area 2 (outside the 10,000-foot range). STLAA's response was no: the entire area is within the Restrictive Covenant and subject to FAA review if “new landfilling operations” were to occur. In particular, STLAA explained that construction of an on-site disposal cell would not qualify as an expansion or change to an existing landfill because the Bridgeton Sanitary Landfill was already in closure mode, but would instead constitute “new operations” at the Site and therefore would trigger FAA review. STLAA stated that it could not predict the changes that any excavation activities would cause to the migratory patterns of birds and could not take the risk that such changes would increase the local bird population. STLAA stated that its 2006 letter, submitted during the public comment period on the ROD for Operable Unit I, still reflected its position.*

*Notes of this 2010 meeting were provided to the EPA and are included in Appendix A.”*

Comment: Delete, or add all of the following at a minimum:

- Discussion referencing the October 2014 LGL Limited report for Republic Services that concluded: *“In unlikely event that excavated waste contains edible organic material, bird populations can be successfully controlled and there will not be an increase in risk to aircraft using the Lambert-St. Louis International Airport.”*;
- Discussion of the report dated December 2013 titled *Demonstration of continued effectiveness of the bird control program at the Forward Landfill, Manteca California 2012 – 2013* by LGL Limited for Republic Services which concluded: *“... control program continued to be virtually completely effective...”* for bird control; and
- Discussion regarding the dialogue meeting of stakeholders hosted by EPA on August 15, 2016 where bird hazards and the NEA were brought up.

51. Section 3.1.3.1 Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, page 95:

The preliminary draft FFS stated: *“The fact that the majority of the materials are solid waste, including the RIM itself, suggests that the more appropriate cap design would reflect the solid waste closure criteria. However, the presence of RIM and its unique (relative to the overall MSW) characteristics of emitting gamma radiation and radon, indicate that additional measures, such as those developed for UMTRCA tailing piles, could also be appropriate.”*

EPA comment #78 stated: *“Revise the third and fourth sentences to state, “The fact that the RIM materials account for the majority of the risk posed by the Site, which include exposure to gamma radiation and radon, as well as, the potential for RIM to leach, indicate the cap design should focus on the performance standards of UMTRCA. Additional measures as specified by any RCRA closure criteria should supplement the design of the capping system to ensure it is protective for all materials present at the Site.”*

The revised draft FFS now states: *“The fact that the majority of the materials are solid waste, including the RIM itself, suggests that the more appropriate cap design would reflect the solid waste closure criteria. However, the presence of RIM and its characteristics of emitting gamma radiation and radon, as well as the potential for leaching, indicate that UMTRCA cap design performance standards may be appropriate.”*

Comment: Revise the sentences consistent with EPA’s comment.

52. Section 3.1.3.2 Missouri Solid Waste Management Regulations, page 98:

*“Because these areas contain solid wastes, the RCRA Subtitle D regulations and the MDNR Solid Waste Management Regulations represent the primary standards for design and implementation of a containment remedy.”*

Comment: Revise to state: *“Because these areas contain solid wastes, the RCRA Subtitle D regulations and the MoDNR Solid Waste Management Regulations must be considered in addition to UMTRCA performance standards for design and implementation of a containment remedy.”*

53. EPA comment #81:

*“Section 3.1.3.3, Page 61, first paragraph – This paragraph contains redundant statements regarding the applicability of RCRA Subtitle C regulations at MSW landfills. In addition, the statements assert that the EPA has indicated that RCRA covers are generally not appropriate for large municipal landfills. Revise this statement by deleting any redundancy, and clarifying that while RCRA Subtitle C covers are generally not appropriate for municipal landfills with lower toxicity waste, this is not the case at the West Lake Landfill due to the presence of higher toxicity RIM.”*

PRP response: *“Section 3.1.3.3 of the FSS reviews RCRA Subtitle C requirements, including final cover requirements, to determine if they are applicable or relevant and appropriate to West Lake Landfill OU-1.”*

Comment: EPA’s original comment was not resolved.

54. Section 3.3.2 Full Excavation Alternative, page 110:

*“Although the UMTRCA standards are not applicable or appropriate for the landfill portion of OU-1 (see prior discussion in Section 2.2.3), they do represent standards that have been established by EPA for remediating radionuclide occurrences to allow for unrestricted use.”*

Comment: Replace with “UMTRCA standards are not applicable, or relevant and appropriate for the full excavation alternative.”

55. Section 3.3.2 Full Excavation Alternative, page 114:

*“EPA’s current non-carcinogenic screening level for elemental uranium is 230 mg/kg for commercial/industrial land uses<sup>20</sup>.”*

and

*“EPA’s radionuclide preliminary remediation goal (PRG) calculator was used<sup>21</sup> to evaluate risks to a composite worker exposed to 50 pCi/g of elemental uranium using calculator default parameters.”*

Comment: Comparing the proposed PRG of 50 pCi/g total uranium to a commercial /industrial screening level is inconsistent with the comparison applied to other radionuclides. Please ensure consistency.

56. EPA comment #94:

*“Revise the last sentence on the page to explain that all the partial excavation alternatives were discussed during a meeting in September 2014 between the EPA, the Respondents, and the MDNR. As stated in Section 2.2.8, Principal Threat Wastes, ‘...it is*

*conservatively assumed that principal threat wastes may be present within OU1.' According to the EPA's guide to Principal Threat and Low Level Threat Wastes, OSWER Directive 9380.3-06FS, November 1991, 'Principal threat wastes are those source materials considered to be highly toxic or highly mobile that general cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids and other highly mobile materials (e.g., solvents) or materials having high concentrations of toxic compounds. No 'threshold level' of toxicity/risk has been established to equate to 'principal threat.' However, where toxicity and mobility of source materials combine to pose a potential risk of 10<sup>-3</sup> or greater, generally treatment alternatives should be evaluated." The EPA notes that the draft updated BLRA presents a total risk to a future grounds keeper for Area 2 at 2.08x10<sup>-03</sup>. Further stated on Page 110 of the FFS in footnote 19, "In all cases evaluated in the Baseline Risk Assessment, Th-230 and Ra-226 (plus decay products) accounted for more than 95% of the risk to the target receptors." The EPA also notes that the BLRA is currently being revised in response to the EPA comments. While the standards in 40 CFR 192.12(a) and OSWER Directive 9200.4-25 provide guidance on establishing cleanup goals at 5 pCi/g of combined radium and 5 pCi/g of combined thorium plus background based on unrestricted use at sites where 40 CFR 192.12(a) is an ARAR or TBC, residential site use is not a reasonably anticipated use at this Site, as was discussed in prior comments. Selecting a cleanup goal that is one order of magnitude greater than 5 pCi/g or 50 pCi/g plus background, would reduce the total risks to the maximally exposed individual in the future to less than 10<sup>-3</sup>. Therefore, a cleanup goal of 52.9 pCi/g combined radium and combined thorium is to be considered for any remedial alternative that seeks to remove contaminants at the landfill to the extent necessary to reduce risks posed by RIM to less than 10<sup>-3</sup>"*

Comment: The comment has not been addressed in the context of Principal threat wastes.

57. Section 4.3.2.1 Capping and Covers, page 124:

*"Factors influencing the selection of materials and the design include the desired functions of cover materials, waste characteristics, climate, hydrogeology, projected land use, and availability and costs of cover materials."*

Comment: Add "service life" as an influencing factor.

58. Section 4.3.3.6 Apatite/Phosphate-Based Treatment, page 133:

*“Radium and thorium, and to a lesser extent uranium, are the major radionuclides of concern at the Site relative to potential leaching to groundwater. Thorium is known to be highly insoluble and uranium is relatively insoluble under reducing conditions such as those that occur at MSW landfills. Neither of these radionuclides has been detected in dissolved-phase groundwater at levels above background. Therefore, radium would be the key constituent for treatment using apatite materials.”*

Comment: Delete, at minimum, “Neither of these radionuclides has been detected in dissolved-phase groundwater at levels above background.” Background has not been established, and conclusionary statements are inappropriate without adequate investigation.

59. Section 4.3.3.6. Apatite/Phosphate-Based Treatment, page 134:

*“Uncertainty exists as to whether apatite formation can be initiated synthetically under field conditions associated with MSW, including whether apatite solids or solutions can be delivered and homogeneously distributed within an overall heterogeneous matrix of MSW, which in the case of Areas 1 and 2 have been shown to be in generally unsaturated conditions (EMSI, 2017a and EMSI, 2000).”*

Comment: Delete, at minimum, “which in the case of Areas 1 and 2 have been shown to be in generally unsaturated conditions (EMSI, 2017a and EMSI, 2000)”, and apply globally where unsupported conclusions are inserted regarding groundwater.

60. Section 5 Remedial Action Alternatives, page 158: “This section provides descriptions of the remedial alternatives evaluated in this FFS, including the ROD-selected remedy, an UMTCRA cover alternative, the full excavation alternative, and three partial excavation alternatives.”

Comment: Replace sentence with “This section provides descriptions of the remedial alternatives evaluated in this FFS, including the ROD-selected remedy, post-ROD cover alternative that includes elements of SFS and UMTRCA cap alternatives, the full excavation alternative, and three partial excavation alternatives.”

61. Section 5.1.1 Remedial Alternatives Evaluated in the 2006 FS, page 160:

*“In addition to the presence of RIM in Areas 1 and 2, the FS also developed remedial alternatives to address presumed historic erosion of the landfill berm along the west side of Area 2 and the resultant deposition of radiologically-impacted soil on the surface of the Buffer Zone/Crossroad Lot 2A2 property (former Ford property).”*

Comment: Delete “presumed historic erosion of the landfill berm along the west side of Area 2 and the resultant”

62. Section 5.1.3 Remedial Alternatives Evaluated in the FFS, page 161:

*“Based on comments provided by EPA on the 2006 draft of the FFS, an additional alternative, referred to in this FFS as the UMTRCA cover alternative, was developed and added to the FFS evaluations. The UMTRCA cover alternative is similar to the ROD-selected remedy, but with some additional design features, including a compacted clay layer (CCL) designed to achieve a permeability of  $10^{-7}$ , a geosynthetic clay liner (GCL) or other suitable geosynthetic liner in addition to the CCL, and the placement of the biointrusion layer on top of instead of below the CCL. The UMTRCA cover alternative also includes a drainage layer within the lower portion of the biointrusion layer, and may also include rock mulch in the upper portion of the vegetation layer.”*

Comment: UMTRCA requirements are performance based, and do not prescribe a specific design. Delete the design elements of this paragraph and replace with the performance requirements of the UMTRCA ARARs, or specify the performance criteria and discuss how a conceptual design has been developed for cost comparison.

63. Section 5.3 ROD-Selected Remedy, page 164:

*“The precise nature and extent of contaminated soil is uncertain because grading of the Buffer Zone/Crossroad Property occurred after collection of the most recent set of soil sample data.”<sup>28</sup>*

Comment: Discussion of the ROD-Selected Remedy should not provide statements on the characterization of RIM in Lot 2A2/Buffer Zone. The only relevant statement that could be made relating to this topic is that the ROD estimated volume of RIM for Lot 2A2/Buffer Zone area was estimated from limited characterization data prior to 2000. Then, state that for purposes of cost analysis, the estimation has been retained in this FFS despite limited additional information available for the Buffer Zone property. Delete the original statement, and delete or revise the corresponding footnote to be more relevant and less misleading.

64. Section 5.3 ROD-Selected Remedy, page 164, footnote 27:

*“These areas were subsequently filled such that the surface elevations of these areas are now located outside of the 500-year flood plain (FEMA, 2015).”*

Comment: The surface elevation may be above the current designated 500-year flood level, Operable Unit 1 is still within the geomorphic flood plain. Replace “outside” with “above” and replace “plain” with “level.”

65. EPA Comment #111 and PRP response:

EPA Comment: *“Section 5.3, Page 111 – Revise the bullet on page 111 to reflect changes requested in previous comments regarding the use of UMTRCA as the primary standard for the capping alternative.”*

PRP response: *“Per the response to prior comments, a new alternative that includes an UMTRCA cover system has been added to the FFS to address this and other similar comments. This section of the text is describing the major components of the ROD-selected remedy as described in the ROD. Therefore, revision of the bullet is inconsistent with the language presented in the ROD.”*

Comment: The logic of this response does not appear to consider the changes that the subsequent subsections impose on the ROD-selected remedy, such as the current statement in section 5.3.1.1: *“Based on the results of the SFS evaluations, the use of a starter berm has been incorporated into the evaluation of the ROD-selected remedy in the FFS.”* Revise the discussion to be consistent with discussing the ROD-selected remedy only, then discussing all subsequent cover considerations in a separate cover alternative discussion (e.g. Section 5.4).

66. Section 5.3.1.1 Regrading of the Landfill Surface for the ROD-selected remedy, all:

Comment: Related to the previous and subsequent comments regarding section 5.3, much of this section appears to pertain to the supplemental feasibility study and not the ROD-selected remedy. Delete and discuss relevant details of regrading for the ROD-selected remedy only. All post-ROD cover considerations should be consolidated and reviewed separately under the alternate cover alternative (e.g. Section 5.4).

67. Section 5.3.1.2 Management of Materials During Recontouring, page 170:

*“Off-site disposal of any RIM that may be encountered during regrading of the landfill surfaces was not included in the scope of the ROD-selected remedy.”*

Comment: The remainder of the paragraph appears to be beyond the scope of the ROD-selected remedy, and the conclusions drawn do not appear to be supported by any approved and public study or document. Delete the remainder of the paragraph.

68. 5.3.1.3 Removal of Radiologically-Impacted Soil from the Buffer Zone/Crossroads Property, page 170:

*“This design-phase survey would only apply to the Buffer Zone/Crossroads Property and would be performed in accordance with the requirements of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA, DOE, NRC, DOD, 1997).”*

Comment: If this was the intent of the ROD-selected remedy, insert “Under the ROD-selected remedy, this” in place of “This”. If this was not the intent of the ROD-selected remedy, delete.

69. Section 5.3.1.3 Removal of Radiologically-Impacted Soil from the Buffer Zone/Crossroads Lot 2A2 Property, page 171:

*“Off-site disposal of any radiologically contaminated soil excavated from the Buffer Zone or Lot 2A2 was not included in the scope of the ROD-selected remedy.”*

Comment: The remainder of the paragraph appears to be beyond the scope of the ROD-selected remedy, and the conclusions drawn do not appear to be supported by any approved and public study or document. Delete the remainder of the paragraph. .

70. Section 5.3.1.4 Engineered Landfill Cover for the ROD-Selected Remedy, page 171:

*“presented on Figure 5-1. Figure 5-2 presents a profile of the new engineered landfill cover that would be installed under the ROD-selected remedy and would consist of the following layers (from top to bottom):*

- A one-foot thick layer of soil capable of sustaining vegetative growth;*
- A two-foot thick infiltration layer of compacted USCS CL, CH, ML, MH, or SC soil-type with a coefficient of permeability of  $1 \times 10^{-5}$  cm/sec or less; and*
- A two-foot thick biointrusion/marker layer consisting of well-graded rock or concrete/asphaltic concrete rubble.*

*Specifically, the landfill cover to be installed over Areas 1 and 2 would consist of (from bottom to top): 2 feet of rock consisting of well-graded pit run rock and/or concrete/asphaltic rubble ranging from sand sized up to 4 inches such that upon placement would contain minimal void spaces; 2 feet of compacted clay or silt that when compacted at optimum moisture content possesses a coefficient of permeability of  $1 \times 10^{-5}$  cm/sec or less; and 1 foot of soil capable of supporting vegetative growth. The thicknesses of these layers are based on the requirements of the Missouri Solid Waste Rules and the description of the cover system included in the ROD.”*

Comment: This is not a remedial design document. Delete or refer to the design conceptually if used for cost analysis.

71. Section 5.3.1.4 Engineered Landfill Cover for the ROD-Selected Remedy, page 171:

Comment: At the beginning of the subsection, insert “The following conceptual design was used for purposes of cost analysis for the ROD-selected remedy. Ultimately, any engineered landfill cover will need to be protective of health and the environment, and meet all required performance standards and design criteria of ARARs.”

72. Section 5.3.1.4 Engineered Landfill Cover for the ROD-Selected Remedy, page 173:

*“Additional evaluations of the cover design may be performed during the RD phase to further verify that the design of the landfill cover complies with the applicable and relevant and appropriate requirements of other environmental regulations.”*

Comment: Replace this statement with “Cover design will be performed during the RD phase to ensure design of the cover is protective of health and the environment, and complies with applicable and relevant and appropriate requirements, including longevity requirements.” Delete everything else in the subsection that suggests the cover is already designed.

73. Section 5.3.1.4 Engineered Landfill Cover for the ROD-Selected Remedy, page 173:

*“The design of the landfill cover, as well as the gas control, runoff control, long-term groundwater monitoring, and post-closure inspection and maintenance components, would at a minimum meet the relevant and appropriate requirements found in the Missouri Solid Waste Rules for sanitary landfills.”*

Comment: Replace with “The design of all cover components related to the engineered landfill cover for the ROD-selected remedy, including gas control, runoff control, long-term groundwater monitoring, and post-closure inspection and maintenance components would, at a minimum, meet protectiveness criteria and comply with all ARARs.”

74. Section 5.3.1.5 Rock Armoring/Flood Protection of the Toe of the Landfill, page 174:

*“Portions of the Site were developed over the geomorphic flood plain, but these areas were subsequently filled such that the surface elevations of these areas are now located outside of the 500-year flood plain (FEMA, 2015).”*

Comment: Replace the sentence with “Portions of the Site were developed over the geomorphic flood plain of the Missouri River, and these areas were subsequently filled such that the surface elevations of these areas are currently located above the level of the current 500-year flood event.”

75. Section 5.3.1.5 Rock Armoring/Flood Protection of the Toe of the Landfill, page 174:

*“These areas are further protected by the presence of the 500-year levee and supporting flood control system of the Earth City Levee District. In the unlikely event of levee failure during a 500-year flood event, it is possible that flood waters could reach the lowermost two feet (approximate) of the landfill cover toe at the northwestern edge of Area 2. Because the Site is located more than 1.3 miles from the*

*Missouri River, no high-energy water flows would be expected if flood waters reached the Site.”*

Comment: Replace the sentences with: “These areas are currently protected by the presence of the 500-year levee and supporting flood control system of the Earth City Levee District. In a scenario where the levee fails or ceases to exist, according to the 2008 ROD, a 500-year flood event may cause approximately two feet to contact the toe of Area 2. The ROD further concludes that because the Site is currently located more than 1.3 miles from the Missouri River, no high-energy water flows are expected if flood waters reached the Site. However, since design considerations need to account for ARARs projecting 200 – 1000 years into the future in addition to protecting public health through maximum potential toxicity 9000 years into the future, consideration is needed to address the geologic and anthropogenic uncertainties associated with longer time intervals.”

76. Section 5.3.1.6 Stormwater Management/Surface Water Runoff Control, page 175:

*“Given the variability of the waste, it is not possible to predict the quality of the stormwater that could come in contact with exposed waste during regrading at this time. It is anticipated that any radionuclides would be associated with particulates in the stormwater and might include isotopes of uranium, radium, radon-222, and various radon decay products. It is not anticipated that there would be a significant amount of alpha activity actually dissolved in the stormwater, and as such removal of particulates should be sufficient for treatment of the stormwater.”*

Comment: Delete “It is anticipated that any radionuclides would be associated with particulates in the stormwater and might include isotopes of uranium, radium, radon-222, and various radon decay products. It is not anticipated that there would be a significant amount of alpha activity actually dissolved in the stormwater, and as such removal of particulates should be sufficient for treatment of the stormwater.” And replace with “For purposes of preparing cost estimates, it is assumed that particulate removal best management practices will sufficiently address water quality requirements for discharge of radionuclides in stormwater”

77. Section 5.3.1.8 Management of Subsurface Liquids During Construction, page 177:

*“The potential does exist that perched layers/lenses of leachate may be encountered during waste regrading; however, the additional investigations conducted in 2013 – 2015 did not encounter any leachate or perched water in Area 1 or 2.”*

Comment: RI level detail, and commented on in the RI Addendum. Delete.

78. Section 5.4 Engineered Cover – UMT CRA Standards Remedial Action Alternative, page 182:

Comment: Replace the Section title with “Post-ROD Selected Remedy Cover Alternatives and UMT CRA Compliance” and revise the entire section to include all post-ROD considerations including SFS, SFS amendment, and UMTRCA performance based design requirements.

79. Section 5.4 Engineered Cover – UMTRCA Standards Remedial Action Alternative, page 185:

“These components are discussed in detail in Sections 5.3.1.1 through 5.3.1.11 above, and will not be repeated here.”

Comment: While similarities in design may not need to be discussed, differences do. Discuss all differences for all components.

80. Section 5.4 Engineered Cover – UMTRCA Standards Remedial Action Alternative, page 187:

*“Design of the cover systems to reflect the radium activities, and the associated radon flux levels, that will occur after 1,000 years of radium in-growth is intended to address the UMTRCA longevity standard.”*

Comment: The cover also has to be designed to last 200 – 1000 years, which this section does not address. Discuss the longevity standard in terms of cover life.

81. Section 5.5 Full Excavation Remedial Action Alternative, all:

Comment: The section does not discuss diminished cover design and monitoring requirements due to UMTRCA no longer being the overriding ARAR for full excavation. Nor does it detail how institutional controls could be reduced for the excavation alternative. Include these discussions.

82. Section 5.5 Full Excavation Remedial Action Alternative, page 189:

“Several components of this alternative have been addressed above in the ROD-selected remedy and will not be repeated here.”

Comment: State each component that is not being discussed and provide adequate reasoning as to why it is considered the same or substantially similar to components of the ROD-selected remedy.

83. Section 5.5.1 RIM Volumes for the Full Excavation Alternative, All:

Comment: The underlying model that created these volumes is still incomplete and opaque in the steps that were taken to identify RIM and to determine the resulting volumes. Until the model can be understood, and its results repeatable, the volumes presented cannot be independently supported. The entire section should be revised to reflect a defensible model and supported conclusions.

84. Section 5.5.1 RIM Volumes for the Full Excavation Alternative, page 190:

*“The characterization of large regions of the subsurface at any site is always accompanied by uncertainty. This stems in part from the*

*necessity of estimating the continuous extent of properties of interest within the subsurface (here, total volume of RIM) from a number of discrete sample locations. Due to the nature of interpolation, highly accurate estimates can only be obtained based upon the collection and interpolation of point sample results on a small scale. Notwithstanding its limitations, however, interpolation is a reasonable method to apply here. Consistent with this knowledge, the RIM and associated overburden and setback volume estimates were performed to a level of accuracy consistent with the objectives of a feasibility study.”*

Comment: Extraneous, delete.

85. Section 5.5.1 RIM Volumes for the Full Excavation Alternative, page 191:

*“This is compounded by the fact that, as corroborated by the 2015 field investigations, the concentration levels and spatial distribution of radionuclides within the RIM are highly variable due to the inherent heterogeneity of the waste and the variable locations where RIM is concentrated.”*

Comment: Not supported, delete. Furthermore, distribution of radionuclides within RIM is irrelevant. RIM is RIM.

86. Section 5.5.2.2 Material Handling, page 196:

*“As discussed in Section 4, although physical separation has been used to separate soil from refuse in old landfills, it has never been used to separate radiologically-impacted material from solid waste.”*

Comment: Globally replace “radiologically-impacted material” with “radiological material” as needed.

87. Section 5.5.2.7 Management of Subsurface Liquids During RIM Excavation, page 200:

*“It is not expected that groundwater will be encountered during RIM excavation, based on a comparison of typical measured Site groundwater elevations to the anticipated bottom of the anticipated excavations for Areas 1 and 2.”*

Comment: Not supported, delete or replace with supported statement.

88. Section 5.5.5 Final Grading and Engineered Landfill Cover, page 205:

*“Regrading and construction of a final cover would be performed for Areas 1 and 2 as described in Section 5.3.1.1 above, with the exception that the final grades would be a minimum of 5% and the final cover installed for the full excavation alternative would not include the additional 2-foot-thick rock/rubble biointrusion layer.”*

Comment: Replace this statement with “Regrading and construction of a final cover would be performed for Areas 1 and 2 in compliance with ARARs. Since RIM would be removed, performance requirements of UMTRCA cover would no longer be relevant and appropriate and therefore performance and design requirements of state solid waste regulations would control design of the cover. For purposes of cost estimation, the conceptual design for the cap differs from the ROD-selected cover by [insert differences]”

89. Section 6.1.3. Long-Term Effectiveness and Permanence, page 219:

*“...and potential impacts if a subsurface reaction (SSR) were to occur within Area 1 or 2.”*

Comment: Globally replace SSR with subsurface smoldering event (SSE)

90. Section 6.2.1.2 Compliance with ARARs, page 233:

*“Although individual groundwater wells have shown some isolated occurrences of chemical or radiological constituents (e.g., radium) at levels slightly above the UMTRCA groundwater protection standards and the Missouri MCLs, the USGS (2014) concluded that that there is not a strong spatial association of monitoring wells surrounding or downgradient of RIM areas with elevated radium concentrations, as might be expected if RIM areas were releasing substantial quantities of radium to the groundwater.”*

Comment: Replace with “Groundwater testing for OU-1 has shown occurrences of chemical and radiological constituents above UMTRCA groundwater protection standards along with state and federal MCLs.”

91. Section 6.2.1.2 Compliance with ARARS, page 233:

*“Although conditions associated with Areas 1 and 2 currently meet all of these chemical-specific ARARs*

Comment: Unsupported, delete or replace with supported discussion.

92. Section 6.2.1 No Action Alternative, page 231 & 232:

*“Under the No Action alternative...no maintenance would be performed to ensure the integrity of the existing measures.”*

And

*“The Site continues to be an active industrial facility to which access is controlled (including fencing and 24-hour security). It is anticipated that the industrial uses currently ongoing at the Site would continue into the future, and it is assumed that the existing fencing and access controls would remain in effect for the No Action alternative.”*

Comment: These two statements appear to contradict each other, or at the very least lead to opposing future scenarios. Clearly state what the no action alternative assumes.

93. Section 6.2.1.2 Compliance with ARARs, page 233:

*“The No Action alternative is expected to meet all of the location-specific ARARs identified in Section 3.1.2 of this FFS.”*

Comment: Floodplain protection is reliant on current geomorphology and flood control measures. ARARs for the no-action alternative would not be met when maintenance or protection is needed for the toe of the landfill to protect from flooding or scouring.

94. Section 6.2.2 Regrading and Capping (ROD-Selected Remedy), page 236:

*“Portions of the landfill berm that contain slopes greater than 25% would be regraded through construction of a perimeter “starter” berm, regrading the existing landfill materials, and/or placing additional material to reduce the slope angles to 25% or less. The method used to regrade the perimeter portions of Areas 1 and 2 would be subject to physical constraints associated with the location of the toe of the landfill relative to the property boundary or adjacent Site features (e.g., the solid waste transfer station access road).”*

Comment: This statement could not be found in the ROD. Replace with the actual ROD language: “Prior to construction of the landfill cover, the areas will be brought up to grade using placement of inert fill and regrading of existing material as determined in the RD. Final grades will achieve a minimum slope of two percent. 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.” Globally replace any other language that is not consistent with the ROD-selected remedy as stated in the ROD.

95. Section 6.2.2.1 Overall Protection of Human Health and the Environment, page 239:

*“The ROD-selected remedy also requires monitoring of groundwater quality to ensure that groundwater quality at the perimeter of the Site meets state standards or other ARARs”*

Comment: Replace with “The ROD-selected remedy also requires monitoring of groundwater quality to ensure that groundwater quality meets ARARs”

96. Section 6.2.2.3 Long-Term Effectiveness and Permanence:, page 246:

*“The design of the engineered cover included in the ROD-selected remedy is a hybrid cap that was developed based on EPA’s Presumptive Remedy Guidance for CERCLA Municipal Landfill Sites to meet the Subtitle D landfill cover and closure requirements with*

*additional components to address the UMTRCA standards (including the longevity requirement of 40 CFR 192.02)."*

Comment: Replace with "The **conceptual** design...**was** a hybrid cap...to address **some aspects of** UMTRCA standards." And delete everything in parentheses. Then discuss how the cover design will be required to last at least 200 years with minimal maintenance.

97. Section 6.2.2.3 Long-Term Effectiveness and Permanence, page 246:

*"Long-term site management plans and institutional controls would be robust and durable. Longterm groundwater monitoring (as required under the ROD-selected remedy) would be effective in verifying the remedy is performing as required and groundwater is protected. While not anticipated, even with the loss of institutional controls and long-term management, the landfill cover would still act to passively prevent potential contaminant migration and human exposures for an indefinite period."*

Comment: Replace with "Robust and Durable Long-term site management plans and institutional controls would be required. Long-term monitoring under the ROD-selected remedy requires [insert required monitoring]."

98. Section 6.2.2.3 Long-Term Effectiveness and Permanence, page 246:

Comment 98-1: Provide some detail on difficulties and uncertainties that may be associated with long-term operation, for example uncertainties with meeting longevity requirements under conditions such as: being located in the geomorphic floodplain of a major river; being dependent on external controls such as the Earth City levee; Potential for additional settlement and consolidation of landfilled materials; etc.

Comment 98-2: Discuss any potential need for replacement of technical components such as cover and drainage features, monitoring infrastructure, isolation barrier system infrastructure, etc.

Comment 98-3: Discuss the magnitude of the threats or risks should the ROD-selected remedy need replacement.

Comment 98-4: Discuss uncertainties with private ownership of the site.

99. Section 6.2.2.3.4 Potential Impacts of a Subsurface Heating Event, footnote 51, page 253:

*"This reaction has previously been called a "subsurface smoldering event" (SSE) or by some as a fire. The current understanding of the nature of the reaction, however, is that it is occurring in the absence of oxygen, which indicates that it is not a result of fire or smoldering (i.e., combustion). Accordingly, current references are to a "subsurface reaction," or SSR, rather than using the prior SSE*

*terminology. Unlike a fire, the SSR has not produced visible smoke or flames”*

Comment: Subjective, Delete footnote 51.

100. Section 6.2.3.5 Short-Term Effectiveness, page 296:

*“The UMRCA cover alternative would entail some excavation, handling, loading and transport of MSW and possibly RIM within the Site associated with re-contouring to achieve slope requirements, and therefore would pose some short-term exposure risks to on-site workers.”*

Comment: Please clearly state that greater than 100,000 cubic yards of waste is expected to be regraded, recontoured or otherwise moved under this remedial alternative. Please also describe the impacts associated with excavating, regrading, recontouring or otherwise moving that amount of waste material in sections of the alternative analysis. It appears this document currently overlooks this important factor and does not consider the potential impacts on remedy analysis.

101. Section 7 Comparative Analysis of Alternatives, all: Due to the number and significance of comments generated in sections of this document that support the comparative analysis of alternatives, it would be premature to review Section 7 in detail.

Comment: Revise the document so that comparative analysis of alternatives can be adequately performed.

102. Table 3-1 Provides conflicting information regarding whether a citation is or isn't a potential ARAR. For example, Table 3-1a: Preliminary Identification of Potential State Chemical-Specific ARARs and TBC Criteria All Proposed Scenarios, first page states “No” in the “Potentially ARAR?” column, whereas the Discussion/Analysis column states “May be Relevant and Appropriate if encountered” – a similar example is located on the next line down. Additionally “N/A” (Table 3-1b second page) is not an appropriate designation.

Comment: Create tables that clearly state the potential for ARAR

103. Table 3-1 Citation for 10 CSR 20-7.031 (5)(I):

Comment: This citation is applicable to discharges to Fee Fee Creek and Missouri River water sheds, correct the designation as a potential ARAR

104. Table 3-1 Reference to “Missouri Water Quality Standards 10 CSR 20-7.031(5):

Comment: The table identifies this regulation as groundwater medium where “Water contaminants shall not cause or contribute to an exceedance of the following (Table A) standards:” and further

states “These standards are only applicable to public drinking water systems; however, these standards may potentially be relevant[sic] and appropriate standards for groundwater.”

Comment: 10 CSR 20-7.031 contain water quality standards which stated purpose is to identify “uses of waters of the state, criteria to protect those uses, and defines the antidegradation policy. It is developed in response to the Missouri Clean Water Law and the federal Clean Water Act, Section 303(c)(1) and (2), ... These revisions are pursuant to the national goal of protection of fish, shellfish, and wildlife and recreation in and on the water as outlined in Section 101(a)(2) of the Act.” Further, 10 CSR 20-7.031 (5) outlines specific criteria applying to waters contained in Tables G and H of the rule (which includes Fee Fee Creek watershed and Missouri River, that are not exclusive to drinking water uses – neither is Table A). This is a potential ARAR for surface water discharges from the site. Correct the inaccurate statements, then review and correct all potential ARARs with similar inaccuracies as needed.

105. Table 3-1, general: The table appears to exclude potential federal ARARs for 10 CFR Part 61.

Comment: Please include relevant portions of 10 CFR Part 61 and other potential federal ARARs as necessary.

106. Figure 5-1 Extent of ROD-Selected Remedy Landfill Cover:

Comment: Replace the title of the figure to “Conceptual Extent of Cap-in-Place Alternatives”

107. Appendix M, Excavation and Final Grading Plans, general:

Comment: Consistent with the intent of the drawings as stated in Feezor’s drawing notes, change the title of the appendix to “Illustrations of conceptual excavation and grading for remedy alternatives”, and change the title of the cover to “Conceptual Design Illustrations for the...”