



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

11201 Renner Boulevard
Lenexa, Kansas 66219

AUG 25 2017

Mr. Paul V. Rosasco
Project Coordinator
Engineering Management Support, Inc.
25923 Gateway Drive
Golden, Colorado 80401

Dear Mr. Rosasco:

The U.S. Environmental Protection Agency has reviewed the June 16, 2017, Remedial Investigation Addendum, West Lake Landfill, Operable Unit 1. This document was developed on behalf of the West Lake Landfill Operable Unit-1 Respondents, Cotter Corporation (N.S.L.), Bridgeton Landfill, LLC., Rock Road Industries, Inc., and the U.S. Department of Energy to support the EPA's final remedy decision for the West Lake Landfill Site, Operable Unit-1, Bridgeton, Missouri.

The EPA has coordinated its review of this document with the Missouri Department of Natural Resources, the Kansas City and St. Louis Offices of the U.S. Army Corps of Engineers, and the U.S. Geological Survey. In accordance with the Remedial Investigation/Feasibility Study Administrative Settlement Agreement and Order on Consent, Docket No. VII-93-F-0005, and the Abbreviated Work Plan for Remedial Investigation Addendum and Final Feasibility Study dated May 6, 2016, the Respondents shall prepare a revised RIA that incorporates the EPA's comments and requested changes.

The EPA will provide a supplemental comment letter addressing Appendix P and the revised Baseline Risk Assessment.

The EPA requests that the Respondents submit their Response to Comments no later than September 15, 2017 and plan for a meeting during the week of October 2, 2017. The Respondents' revised RIA should be submitted to the EPA by October 27, 2017. In the meantime, if you have any questions or concerns, please contact me either by phone at (913) 551-7141 or by e-mail at jump.chris@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris R. Jump".

Christine R. Jump
Remedial Project Manager
Site Remediation Branch
Superfund Division

Enclosure

cc: Mr. Ryan Seabaugh, MDNR

30323704



Superfund

**Comments on the Revised Remedial Investigation Addendum
West Lake Landfill, Bridgeton, Missouri
June 16, 2017**

General Comments

1. The final document must be updated to provide the current status of documents.
2. The report should include an additional section summarizing the Human Health Risk Assessment, or HHRA, and providing conclusions. Conclusions should be definitive statements about each media impact, radionuclides/chemicals of concern, calculated risks, data gaps, and recommendations.
3. The estimate of extent of radiologically impacted material, or RIM, must be presented clearly and in a straightforward manner. Any data anomalies, where it appears obvious that RIM is not included on figures depicting RIM, must be corrected and clarified in the Remedial Investigation Addendum, or RIA.
4. When using the words "fate and transport," clarify that the reference is to fate and transport of radionuclides or RIM through the subsurface not fate and transport through the groundwater.
5. The report should include validated stormwater data through May 2017.
6. Update the Conceptual Site Model, or CSM, presented in Section 9, as appropriate, based upon revisions made to the document in response to the comments below.
7. Due to the inadequacy of the groundwater monitoring well network beneath the site, remove all conclusions regarding the presence or absence of groundwater contamination from the document. Also, caveat all statements made throughout the document regarding groundwater flow beneath the site as preliminary pending additional investigation work as a part of the Operable Unit-3 Remedial Investigation / Feasibility Study, or OU-3 RI/FS.

Executive Summary

8. General. Clearly state in the executive summary that OU-1 is the subject of the RIA and which media and constituents (radionuclides and chemical) are addressed in this document.
9. Page ES-2, first paragraph. Revise the definition of RIM discussed in the parentheses in the second sentence to include 54.5 pCi/g combined Uranium.
10. Page ES-2, second paragraph. Add a statement in this paragraph that the groundwater potential migration pathway will be investigated under the OU-3 RI/FS.
11. Page ES-2, second paragraph. State the specific standard to which the 0.5pCi/L in this paragraph is referring.
12. Page ES-2, third paragraph. Support the statements made by citing specific information or results from the Baseline Risk Assessment, or BLRA. For example, state what the calculated risks are and what the risk range is.

13. Page ES-2. The last two paragraphs are insufficient for summarizing the findings of the RI (i.e. nature and extent, and HHRA findings). Also, the text should not state that results are "generally below regulatory standards."
14. Page ES-2. Add a brief discussion of the future risks according to the BLRA. The EPA's comments on the BLRA will be provided in a separate letter.

Section 1 – Introduction

15. Section 1.1, page 2. In this document, add text to better clarify how and why further groundwater investigation and evaluation is needed to address groundwater (OU-3 RI/FS). Specifically, in this section, replace the last two sentences of Section 1.1 with the following text:

“While the existing OU-1 data set for groundwater has been expanded and refined since 2008 to include new data and information that are supportive of the Conceptual Site Model (CSM), some uncertainties remain regarding groundwater conditions at the Site. Specifically, data generated following the 2008 ROD, as discussed in Section 7.6.3.1, has demonstrated a potential mechanism of transport of contaminants within the subsurface environment. Additionally, groundwater investigations conducted since 2008, as discussed in Section 7.5.1 and related sub-sections, detected levels of radium above MCLs in both on-site and perimeter wells. These items not only demonstrate the need for consideration of groundwater protection standards for OU-1, but also demonstrate a need for further groundwater investigations and modeling to be conducted under the OU-3 RI/FS process.”

This comment also has implications and applicability to the Executive Summary and Section 9 (CSM), which should be revised to include similar statements regarding the new data, how it potentially applies to OU-1, and the need for additional investigations under OU-3.

16. Section 1.2, page 4. Remove the last sentence in the paragraph discussing the fate and transport modeling.

Section 2 – Summary of Investigations

17. Section 2.1.1, page 6. Add the 2 documents listed below to the Pre-RI Reports list, and incorporate them into the document as appropriate.
 - "Survey for Berm Erosion." West Lake Landfill, St. Louis County, Missouri. April 6, 1984. Oak Ridge Associated Universities under agreement DOE No. 40-770-80, NRC Fin. No. A-9093-0.
 - "Site Characterization and Remedial Action Concepts for the West Lake Landfill." Docket No. 40-8801, 1989, Office of Nuclear Material Safety and Safeguards (NRC).
18. Section 2.1-2.2, pages 11-16, footnotes.
 - a. Footnotes 1-7 and 11-12. The text in these footnotes should be revised to reference the August 4, 2017, letter from the EPA to the Respondents describing how the document(s) are to be incorporated into the final RI/FS for the EPA's review and final approval.

- b. Revise Footnote 8 to state that the EPA provided a comment letter on the Draft Stormwater Monitoring Plan on August 9, 2017, and the document will be revised and resubmitted.
 - c. Revise Footnote 14 to state that The North Quarry Subsurface Temperature Monitoring Probes Work Plan has been approved with modifications by the EPA on July 21, 2017.
19. Section 2.2, page 10, second paragraph. Reword the first sentence of this paragraph to state, "After issuance of the 2008 ROD, in response to public concerns and comments from the EPA National Remedy Review Board, the EPA required the OU-1 Respondents to perform additional investigations and evaluations of conditions associated with OU-1."
20. Section 2.2, page 10, second paragraph. Reword the second sentence to state, "In December 2015, in response to a small surface fire adjacent to OU-1, the EPA issued OU-1 Respondents a Unilateral Administrative Order (UAO) to conduct a Removal Action to address Surface Fire Prevention. This included actions to prevent surface fires and the subsequent migration of contaminants from Area 1 and Area 2 where RIM was present near the surface. The OU-1 Respondents were required to cut down vegetation and place a non-combustible cover (NCC) over those portions of Areas 1 and 2 where RIM was present at the surface."
21. Section 2.2.1, page 13. Include all Westlake Landfill Perimeter Air Monitoring Quarterly Reports through January 2017 in this list. Footnote the 2 most recently submitted reports to indicate the current status (EPA has provided comments, and revised documents will be submitted).

Section 3 – Site Background

22. Please include, in the appropriate subsections, a discussion of all other activities conducted at the landfill complex and the associated timeframes. For example, include information on when the asphalt paved area on the north side of Area 1 was installed and why; when the underground diesel tank was installed; when and where stockpiling of quarry materials or other off-site materials was performed on various areas of the site; when and why the building on Area 2 was constructed and demolished; etc.
23. Section 3.1, pages 22-23. This section should also identify the location of residential areas in relation to the site.
24. Section 3.3.1, page 25, first full paragraph. The text states that the closed demolition landfill was constructed over an area that had previously been used for disposal of sanitary waste. Please clarify the timing for when this area was potentially used for disposal of sanitary waste, when that activity ceased, when it was used for disposal of demolition debris, and when it was closed based on aerial photos, historical documents and any other information available.
25. Section 3.3.2.1 and Section 3.3.2.2, pages 26-27. Include a discussion of the following topics in both sections:
- a. Clarify what is known regarding the start of landfilling operations in parts of Area 2. Include dates or date ranges, and include any known details on types of materials that were placed in this cell(s).

- b. Include an estimated percentage of how full the “unregulated landfill” units were in 1973 around the time radiological material arrived from Latty Avenue, based on aerial photos, elevational data, and all other available information.
 - c. Provide any known details on whether a thicker or “final” cover would have been placed over any unregulated landfill units prior to overlaying permitted units or grading the area with additional fill, and if so, whether it would be identifiable from boring logs. If so, clarify if the “final” cover would have been placed before or after the materials arrived from Latty Avenue. Finally, also include what is known regarding whether any other structures above or below ground were constructed on or near Area 1 and Area 2 during or after the arrival of material from the Latty Avenue Site (i.e., stormwater drainage structures, fences, transfer stations, storage tank, etc.).
26. Section 3.3.2.1, page 26. The text states a materials management plan was approved by the Missouri Department of Natural Resources, or MDNR. Please also indicate whether the EPA approved the plan, which resulted in the placement of inert material on Areas 1 and 2. Provide a figure that illustrates where this “inert fill material” was placed and a figure illustrating the change in surface topography caused by the placement of this material. Discuss any caveats or conditions to the approval, and why placement was stopped. This comment also applies to Section 5.5.2.2.
27. Section 3.3.2.1, page 26. Include in the discussion of the placement of the NCC, the total approximate extent of RIM at or near the surface utilizing the overland gamma surveys and any validated surface samples collected pursuant to the NCC installation work plan. Provide the same information in section 3.3.2.2 for Area 2. Summarize this estimation in the sections of the RIA that describe the Surface Fire Mitigation Removal Action. Finally, add two figures, Area 1 and Area 2, that depict the extent of the NCC, all available surface samples, and any gamma survey data used to identify surface RIM. Reference these figures in Section 3, Section 6, and Section 9, as appropriate, for discussions related to the removal action, occurrences of RIM, and the CSM.
28. Section 3.3.2.1, page 26. Provide information about when, why, and where the asphalt road, parking area, and tank were installed in Area 1, and when they ceased to be used. Indicate whether the installation of this infrastructure affected the location of RIM. Please note, the presence of the diesel tank will need to be taken into consideration during future remediation work.
29. Section 3.3.2.2, page 26-27. Discuss when and why the Shuman Building was constructed, and when and why it was removed.
30. Section 3.3.2.2, page 27, second paragraph. Please provide a date range for when specific portions of Area 2 were abandoned and allowed to be vegetated or were covered with “inert fill material,” and expand, as necessary, to add to the CSM.
31. Section 3.3.3, page 27. Discussion of the Inactive Sanitary Landfill and Closed Demolition Landfill should be included in this report only to the extent the discussion relates to OU-1. To that end, include more specific discussion regarding activities or physical features known or suspected to be occurring in these areas during the time RIM would have been transported and placed/used at the landfill. Support any discussion with aerial photos, historical records, or other credible sources of information. Also, discuss any uncertainties associated with the OU-1/OU-2 boundary, and indicate that, if necessary, these will be addressed during pre-design investigation.

32. Section 3.3.4, page 28. For consistency, add a statement that the former permitted landfill was referred to as the former Active Landfill in the OU-2 Record of Decision, or ROD.
33. Section 3.3.4, page 28, first paragraph. Delete the last sentence, and replace it with, "The Bridgeton Sanitary Landfill is included within the scope of Operable Unit-2, and regulatory authority has been deferred to the MDNR, per the selected remedy under the OU-2 Record of Decision."
34. Section 3.3.4, page 28-29. Since this section is giving a site history and description of the characteristics of Bridgeton Landfill North and South Quarry areas, add a statement about a subsurface exothermic reaction, or SSR, occurring in the South Quarry area, and include a reference to Section 5.7 for more details regarding the SSR.

Section 4 – Site Investigation Activities

35. Section 4, General.
 - a) There are two additional prior investigation/characterization reports that contain pertinent information to the CSM, and other aspects of the site. Please include a discussion of:
 - i) Site Characterization and Remedial Action Concepts for the West Lake Land fill. Docket No. 40-880; July 1989, U.S. NRC; and
 - ii) Survey for Berm Erosion. West Lake Landfill, St. Louis County, Missouri, A.J. Boerner, 1984.
 - b) When discussing previous investigations and conclusions, please indicate if a more recent evaluation has changed the information or conclusions being discussed, and reference where in this document that information can be found.
36. Section 4.2, page 32. This section, titled "Threatened and Endangered Species," presents information about wetlands, as well as, a threatened or endangered species assessment. Revise the title to, "Threatened or Endangered Species and Wetlands Assessment."
37. Section 4.3.3, page 36, first paragraph. Revise the last sentence of the section to read as follows: "The purpose of the infrared survey was to identify any heat signatures associated with the ongoing subsurface smoldering event in one of the non-radiological cells in Operable Unit 2, and to help delineate the extent of this event."
38. Section 4.3.3, page 36, second paragraph. Replace the first sentence of this paragraph with the following statements, "In the area of the subsurface smoldering event in the Former Active Sanitary Landfill cell in Operable Unit 2, all temperature differences observed were due to surface features, such as the black plastic cover placed by the facility. Due to limitations of the sensitivity of the infrared imager on the ASPECT airplane, the data did not show any temperature differences that could be attributed to the subsurface smoldering event. This is due in part to the depth of the subsurface smoldering event (ranging from approximately 40 to 160 feet below the surface, based on data reported to the MDNR)."
39. Section 4.3.3, page 36 last paragraph. Replace "According to the report of the survey results, all of the elevated radiation measurements were detected during the West Lake Landfill survey over 20 contiguous acres associated with Operable Unit 1, Area 2" with the actual statement in the

report, "All of the gamma radiation measurements that were significantly higher than background were detected at 20 contiguous acres within Operable Unit 1, Area 2."

40. Section 4.3.3, page 36, last paragraph. It is recommended that the information in Footnote 27 be brought into the body of the report.
41. Section 4.3.4, page 37, third paragraph, and Appendix A-4. Since each of these overland gamma surveys were conducted for different purposes and the criteria for establishing the locations for RIM have not been stated in this section, the reader cannot interpret the results of this data. Please make the following revisions:
 - a. State in this section the individual backgrounds or baselines that were determined for each investigation (i.e. the overland gamma surveys associated with the Phase 1 investigations, the similar surveys associated with the additional characterization investigation (Appendix A-4), and the surveys associated with the installation of the NCC (Appendix A-7)).
 - b. Include a summary of the procedure used to determine background, and provide a reference to the document that explains this procedure in more detail.
 - c. Explain how this data was used to determine where RIM is located, and, in general, the conclusions reached from each of the figures depicting the various overland gamma surveys mentioned in this section.
 - d. Discuss any actions taken based on the results of specific surveys.
 - e. Check Figure A-7.1. It appears that some of the gamma surveys performed to check for RIM at the surface are not presented on this map, and should be added.
42. Section 4.3.4, page 37, last paragraph, and Section 4.3, page 27, last bullet. Expand the paragraph in Section 4.3.4 to summarize the procedures in the NCC work plan that determine the placement of the NCC. Specifically include a discussion of when gamma surveys are conducted, as required in this work plan, and how sampling is utilized to confirm or expand the extent of the NCC.
43. Section 4.3.5, pages 37-38. Revise the first sentence as follows, "In May 2014, the EPA, with support from Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START), collected gross gamma ..." Also, include text that indicates the gamma surveys conducted at the Bridgeton Municipal Athletic Complex, or BMAC, were utilized to select soil sampling locations as specified in the preliminary and final BMAC reports.
44. Sections 4.4.1 and 4.4.2, pages 40-41. It is unclear how the data from the 1982 Radiation Management Corporation, or RMC, report (gamma scanning, IG/gamma spec, and limited sample analysis) are being utilized in the RIA. Section 4.4.2 states that the McLaren/Hart's soil boring and logging investigation included down-hole radiological logging of the existing monitoring wells and cased soil borings remaining from a prior site investigation (RMC, 1982). Please state in Section 4.4.1 and Table 4-1 that the 41 borings identified in the Nuclear Regulatory Commission/Radiation Management Corporation investigation correspond to the subsequent tables and discussions in the text to boring IDs that begin with "PVC." Since gamma logging was performed on one or more of these boring locations at least twice, indicate in the

various tables and discussions in the text the date that the associated gamma log was performed and the investigation that it is associated with. It also needs to be clarified which data set was used to interpret RIM intervals. This should be clarified in the text of the sections that discuss Table 4-3a, Table 4-3b, Table 6-4, Table 6-5, and in Section 6.5.

45. Section 4.4.2, page 41, first paragraph after the bullets. Clarify what is meant by "soil boring advancement."
46. Section 4.4.2, page 41. Discuss how the downhole gamma results of the previous cased borings compare with the 1982 RMC report qualitatively and spatially. Discuss whether the results of this comparison contradict previous findings discussed in the RMC 1982 Investigation, the subsequent 1988 Nuclear Regulatory Commission, or NRC, Summary Report, and the 1989 NRC Site Characterization and Remedial Action Concepts for the West Lake Landfill. Incorporate this evaluation into Section 6 and the estimated occurrences of RIM.
47. Section 4.4.5, page 45. The first paragraph discusses an isolation barrier, but doesn't discuss the purpose of the proposed barrier. Include the following statement after the first sentence in this section, "The Isolation Barrier system includes cooling loops, monitoring points, and infrastructure to prevent potential impacts if a subsurface smoldering event were to come into contact with the radioactive materials contained in the West Lake Landfill."
48. Section 4.4.5.1, page 49, first paragraph. The second to last sentence indicates the Gamma Cone Penetrometer, or GCPT, encountered refusal due to the presence of "inert" fill. Discuss the properties of the inert fill encountered, as all inert fill does not cause refusal.
49. Section 4.4.5.2, page 51. Discuss how differences in core gamma scans, downhole scans, and sampled interval depths were reconciled in determining extent and thickness of RIM, and how this might affect the geostatistical model and CSM.
50. Section 4.4.7, page 53, last sentence in the section. In addition to citing the S.S. Papadopoulos and Associates, Inc. document, include the data summary tables and associated lab reports in an appendix to the RIA. Add a reference to this appendix in this section.
51. Section 4.5.2, pages 57-58. State in this section that the background samples collected as a part of this investigation were used to establish the background levels associated with the definition of RIM. Add a reference to Section 6.2.5 and Figure 6-1 to refer readers to the where additional details regarding background are discussed. Include a brief description of the locations that the background samples were collected from relative to OU-1.
52. Section 4.5.2, page 58, first paragraph after bullets. In the second sentence, it appears the phrase "... two samples" should read "... two subsurface samples." Revise for clarity.
53. Section 4.5.5, pages 62-64. Revise this section based on the fact that the Fate and Transport Evaluation document will not be revised and submitted as part of the RIA/FFS. Briefly discuss the sampling, analyses, and results.
54. Section 4.5.5, partial paragraph at the top of page 63. Add a sentence at the end of the paragraph that states the analytical data from these samples was also used to evaluate the potential for radionuclides to be mobilized or to leach from RIM in the landfill.

55. Section 4.5.5, page 64, last bullet. All of the other bullets in this section state the purpose for the analysis listed in the bullet (i.e. to evaluate ..., to estimate ...). Add the purpose for the Sequential Batch Leaching Tests to the last bullet.
56. Section 4.5.5, page 64, first paragraph after bullets. The first paragraph after bullets states that lab reports for these data were provide to the EPA in the monthly status reports for March, April, and May 2016. Clarify specifically which analytical data related to these analyses are utilized in this RIA, and add that data as an appendix to this document, if it is not already included. Include a reference to that appendix.
57. Section 4.5.6, page 65, last paragraph. Summarize in this section the portions of Appendix D-12 that discuss the Cotter samples.
58. Section 4.5.6, page 66, first paragraph. Provide a high level summary of the results of the data usability evaluation that was performed.
59. Section 4.5.7, page 66, second paragraph in the section. Revise the last sentence as follows, "Soil sampling results from BMAC that exceeded the Background Threshold Value (BTV) were compared to the EPA's preliminary remediation goals (PRGs) for residential soil to determine if further data review or investigation were warranted."
60. Section 4.5.7, page 66, third paragraph in the section. Revise the second sentence as follows, "Overall, less than 10 of the 88 samples collected from BMAC were determined to be above the BTVs for any radionuclide, and the results for all 88 samples were below EPA PRGs as specified in the final report."
61. Section 4.6, page 68, fourth paragraph.
 - a. Revise the last sentence of this paragraph to state, "...however, this seepage appears to remain localized. While no seepage or flow has been observed on the face of the Area 2 slope, this area is overgrown and has not been regularly inspected for flow."
 - b. This paragraph states that McLaren/Hart interpreted the seep to be associated with the perched water located nearby. Engineering Management Support, Inc., or EMSI, did not identify perched water in the later investigations, yet the seep is still flowing. Further discuss the origin of the seep, and clarify this discrepancy.
62. Section 4.6. State the results of the perched water and seep sampling in this section, or reference the section that includes this data.
63. Section 4.7, pages 70-71.
 - a. There is additional information available for the northern berm adjacent to the Buffer Zone in the Survey for Berm Erosion document referenced above. This document indicates that the erosion was occurring in and prior to 1984, and provides additional information about the topography and radiation levels. Revise this section and other pertinent sections discussing the berm, as appropriate, taking this document into consideration.
 - b. The paragraph at the bottom of page 70 and the top of page 71 discusses why additional slope stability analyses were not conducted, and states that the EPA agreed to the

approach. Provide additional context to explain when and why this discussion occurred. Since additional investigation has been conducted and additional alternatives are being considered in the Draft Final Feasibility Study, or FFS, the EPA recommends this paragraph be revised to indicate that the EPA agreed additional slope stability analysis was not necessary at that time. However, regrading of the slope is being further evaluated in the FFS, and the need for future sampling, analytical or geotechnical, may be re-evaluated during the Remedial Design.

64. Section 4.11.1, page 75. Revise the first sentence in the section to clarify that eight of the ten samples were collected onsite.
65. Section 4.11.2, page 75. Discuss the Metropolitan Sewer District, or MSD, standard, and the relevance of exceeding it from a remedial investigation perspective.
66. Section 4.11.5, page 80. Please replace the language in the second and third paragraphs with the following language:

“The EPA provided contact information for the six wells previously sampled by the EPA north of the site and other nearby offsite wells previously identified by the USGS to the Respondents for sampling. Herst and Associates, on behalf of EMSI, contacted the various owners of the six private wells north of the site and the owners of other water wells in the general area of the site, and inquired about their willingness to have their wells sampled on behalf of the OU-1 Respondents. Only one owner that owned two alluvial wells, B4-S and B4-D, located south of the site agreed to allow samples to be collected. Herst & Associates collected samples from these two wells in August 2013.

After attempts to gain access to these wells were unsuccessful, the EPA requested that the USGS attempt to obtain access for sampling. The USGS subsequently contacted the various well owners about allowing the USGS to collect samples from the wells and obtained permission to sample three alluvial wells; two that were sampled during August 2013 by Herst and Associates, B4-S, B4-D, and well B3. Owners of these wells had been previously contacted by the Respondents. The USGS also was able to obtain permission to sample three additional bedrock wells, two that were about 3.5 to 5-miles south or southwest of the site, D1 and A5, and one, E1, about 13.5 miles southwest of the site near Weldon Spring (USGS, 2014). During November 2013, the USGS collected samples from wells B3, B4-S, A5, D1, and E1. Well B4-D had been winterized, and was not accessible to be sampled. Herst and Associates collected split samples with the USGS. Further discussion of the results of the USGS evaluations is presented in Section 7.5.1.1.5 of this RI Addendum.”

67. Section 4.12, page 81, first paragraph, last sentence. Replace the last sentence with, “These samples are analyzed for radiological and non-radiological parameters.” Indicate whether the analytes include all potential contaminants of concern, or COCs, for OU-1.
68. Section 4.12.2.2, page 89, last paragraph. Revise the last sentence by removing everything after “greater than 0.1 inches” and replace with “Observations during the period of <insert period of observation> have not identified erosional channels or sediment deposition areas.”

69. Section 4.12.2.2 and Appendix G. Appendix G-4 has a chain of custody and sample results for a sample labeled as "Buffer Zone" and another as "SCRR@A1." Clarify whether these samples are discussed in this section, and add them to figure 4-15 and 4-16, if appropriate.
70. Section 4.13.1.1, page 92, last paragraph. Add to Figures 4-18 and 4-19, the approximate extent of RIM at the surface based on the data that was collected from a similar time frame, i.e. based on the McLaren/Hart overland gamma survey and any surface soil samples collected during the original remedial investigation. Add statements to explain that this estimated extent of surface RIM is based mostly on field measurements of gamma data, and as such, likely underestimate the true surface extent of RIM due to the presence of Thorium-230. Evaluate whether the upwind sampling locations are likely to be upwind of any surficial contamination, and therefore, whether differences in the sampling results between upwind and downwind locations should be expected. Summarize this evaluation in Section 7.1.2.1.
71. Section 4.13.1.2, page 93, first and second paragraph. Add the following sentence to the end of the first paragraph in this section, "The results of this sampling were all below levels specified in the associated health and safety plans." Delete the second paragraph in this section.
72. Section 4.13.1.2, page 93, second and third paragraph, last sentence of each. Remove the word "well" and insert the range of results.
73. Section 4.14.3, page 103. Remove the sentence stating, "As of the date this draft RI..." State the general purpose of the NCC vegetation sampling in this section, and state that the data will be presented in the Final Surface Fire Prevention Removal Report.
74. Section 4.15, page 103. The paragraph implies that the entire effort of the historical aerial photograph evaluation was done by the EPA's Environmental Monitoring Systems Laboratory. Clarify the text to accurately reflect the review process.

Section 5 Physical Characteristics of the Study Area

75. Section 5.2, page 106. Provide a figure showing the coverage of all negative easements, covenants, and restrictions in relation to areas of the site. Include all covenants and restrictions in an appendix to this document.
76. Section 5.3.1, pages 107-108. The last sentence in this section is inconsistent with the findings of the NCC work and the observed and documented outfalls associated with portions of Area 2 (Buffer Zone). Revise this section to refer readers to other document sections discussing the current understanding for this area (ex. 5.3.3.1). Additionally, revise the last sentence of this section to include a brief discussion of the topography associated with the Buffer Zone and other portions of Area 2 (OU1-003 and OU1-004) that may not include the "berms" as discussed in this sentence to manage and control stormwater.
77. Section 5.3.3.1, page 109, second paragraph. The last sentence states that "all runoff from Area 1 ultimately flows into the Northeast Perimeter Drainage Ditch, which then flows into the surface water body located north of Area 2 on the northeastern-most corner of the Site (the North Surface Water Body)." Please indicate whether the drop box study along St. Charles Rock Road confirmed this statement.

78. Section 5.3.3.3, page 110. The first paragraph in this section discusses weir 5 sediment samples “in the vicinity of the historic berm failure and resulting erosional runoff.” Other sections, 3.4 and 6.7, state that migration onto the buffer zone was caused by erosion not berm failure. Use consistent language when referring to this issue. The EPA recommends adding a brief section to specifically discuss the nature and history of the berm(s) and the rationale for erosion vs. berm failure in the buffer zone area. Include discussion of the topographic elevations on both sides of the berm. Also see comment on Section 6.7.
79. Section 5.3.3.4, page 111. Add discussion to the second paragraph regarding whether there are or were surface water outlets or discharge points from the North Surface Water Body. Discuss any specific actions or inspections taken to identify such outlets.
80. Section 5.3.4, page 112, first paragraph. Revise the last sentence by adding the following statement to the end, “including the majority of Areas 1 and 2.”
81. Section 5.5.2.1, page 123, first paragraph. The EPA and respondents have previously discussed the fact that there is information regarding some materials sent to the landfill in CERCLA Section 104(e) responses located in the Administrative Record. Use the 104(e) information in the Administrative Record to expand the discussion in this paragraph (and other pertinent sections of the document) to clearly describe what is known regarding the materials that have been sent and placed into the various landfill cells.
82. Section 5.5.2.1, page 123, second paragraph. The third line up from the bottom of page 123 is an incomplete sentence that begins with, “In 1969, most of the disturbed...” The sentence immediately above the incomplete sentence is also difficult to understand, and the EPA recommends it be broken into more than one sentence. There is no discussion of potential historical activities on the land located between areas 1 and 2. Please expand the discussion to include this area.
83. Section 5.5.2.1, page 124.
 - a. The text at the top of the page indicates that ungraded piles of material are visible on the area north of Area 1 in September 1973. It should also be noted that this is the time period when material from Latty Avenue may have been stockpiled on site to be used as daily cover.
 - b. Describe what is meant by “inert fill” as used in this section (first complete paragraph on p.124 and top of p. 125.), and how it is different from construction debris. Explain what the purpose of the inert fill was in 2006-2008, or refer to the discussion in section 5.5.2.2 where it is more fully discussed.
 - c. A significant amount of municipal solid waste, or MSW, was apparently placed over previously landfilled material in the southwest corner of Area 1 (muffin top). Indicate whether this activity is visible in the aerial photos and discuss.
 - d. Describe how the approximate edge of refuse illustrated on Figures 5-9 through 5-12 was determined, especially where there are no borings.

84. Section 5.5.2.2, page 126.
- a. There is no discussion of RIM materials located at the surface of areas 1 and 2 in this section or in Sections 6 or 9. The CSM needs to account for the presence of this material at the surface of the landfill. Provide a discussion in this section, or where appropriate, that addresses this distribution (i.e., was Latty Avenue material used as final cover, or stockpiled on these areas, or brought to the surface by construction activities?).
 - b. First full paragraph. Provide the boring logs or field notes to support these statements about soil cover thickness.
 - c. The last two paragraphs in this section appear to indicate the average soil cover thickness determined in 2000, were slightly less than the average thickness calculated from the additional investigation data (3 to 5 feet vs 7.6 feet in Area 1, and 1 to 2 feet vs. 6.7 feet in area 2). It is not clear from the text whether this is due to the placement of inert fill material or a more robust data set, (including soil thicknesses up to 25 feet). Please clarify.
85. Section 5.6, page 127. Delete the last two sentences of the second full paragraph related to what the cross section Figures 5-13 and 5-14 show. These sentences are misleading, and the EPA does not agree that these figures show that (all) RIM is located above the water table.
86. Section 5.6, page 128, third and fourth lines. Delete language regarding the evaluation of the extent and fate and transport of radionuclides and CSM, so that the sentence reads, "however, a discussion of the hydrogeology is included in this OU-1 RI Addendum as it is part of the update to the prior (2000) RI report."
87. Section 5.6, page 128. Add a sentence at the end of this paragraph that states: Site-specific interpretations and conclusions presented in the OU-1 RIA will be re-evaluated and potentially superseded based on additional data and information collected during the OU-3 RI/FS
88. Section 5.6.1 page 128, third paragraph. Revise this section to remove the mention of individual units in the Ozark Aquifer since it is not germane to the hydrogeology of the site. Statements made regarding the Ozark Aquifer are partially correct; however, the text contradicts itself given the first paragraph indicates that the major bedrock aquifer in the St. Louis area is the Ozark Aquifer, and in the second paragraph states "these formations are generally not used as a source of potable water." Revise the description of the bedrock aquifer to the following:

"Groundwater is present in both the bedrock units and the unconsolidated materials. The Mississippian-age bedrock units that underlie the site are generally described as the Post-Maquoketa aquifer, which includes: younger rocks (Mississippian and Pennsylvanian) that are not present at the site, the Osagean Series St. Louis Limestone, Salem Formation that were quarried at the site and the underlying Warsaw Formation, older Mississippian-age rocks, and rocks of Silurian and Devonian rocks. Beneath the Post-Maquoketa aquifer are rocks of the Ozark confining unit and the underlying Ozark Aquifer that is widely used in most of southern Missouri for water supply.

Miller et al. (1974) described rocks in the Post-Maquoketa aquifer as yielding small to moderate quantities of water ranging from 0 to 50 gpm, and generally not favorable for groundwater development. In addition to low yields, groundwater quality is variable with much of this aquifer, and the underlying Ozark aquifer transitioning from fresh water in southwest St. Louis County to generally saline water to the northeast (Miller et al. 1975). Owens (1960) noted locally variable water quality within the Mississippian rocks in the St. Louis area, a layer of gypsum commonly present at the base of the St. Louis Limestone that could contribute sulfate to groundwater, and mineralized water present in some areas beneath the Warsaw Formation.”

89. Also see related comment to Section 5.6.2.5. Section 5.6.2.2, page 132, second paragraph. Pre-MDNR doesn't preclude construction and operation of leachate collection systems in prior units. State whether leachate collection systems were historically operational, and if so, show where.
90. Section 5.6.2.4, page 135. Add a statement at the end of this paragraph stating, "Site groundwater data gaps have been identified. Further evaluation of those data gaps will be used in the development of the groundwater (OU-03) RI/FS."
91. Section 5.6.2.4.1, page 137, first paragraph.
 - a. Revise the first complete sentence on this page "... In the vicinity of the Bridgeton Landfill, groundwater ..." to add "Bridgeton Landfill, Golder (1996) concluded that groundwater flow ..." to clarify these are previous conclusions. Also, is the Bridgeton Landfill different from the "sanitary landfill?" As both terms are used in this sentence, revise to clarify and use consistent terminology, as appropriate.
 - b. Insert the word "generally" into this same sentence in the phrase "... groundwater flow was generally toward the Bridgeton Landfill in response ..." because there is insufficient data to verify this inward gradient in all areas.
92. Section 5.6.2.4.2, page 141. This section discusses gradients between bedrock and alluvium. Revise this section, and elsewhere as appropriate, to state that the Missouri River is considered a regional drain for groundwater, and that upward gradients between the underlying bedrock and alluvium are a part of the natural hydrogeology of the region (Miller 1974).
93. Section 5.6.2.5, page 144, last sentence of the center paragraph. "Therefore, an overall value of 3×10^{-2} ..." seems to be a conclusion of this section in the document, yet the next paragraph summarizes previous related studies. It is unclear how the "therefore" statement in this paragraph relates to the previous sentences because only two average values are presented that do not yield 3×10^{-2} . Please revise this section to clarify, or provide a reference to clearly describe how/where the 3×10^{-2} value was obtained.
94. Section 5.6.2.8, page 147. The EPA questions the assumption of an aquifer thickness of 100 ft listed in Table 5-5 and resulting flux of 76,000 gpd. This estimate appears too large, as the majority of flow in the alluvial aquifer will be through the coarser sands and gravels located in the lower part of the aquifer. Substantial flow/flux within the upper 10-30 ft. of the silty-sands is atypical, and likely not occurring at the site. Revise the text to provide a range of estimates, high-low, using a range of thicknesses and gradients. The EPA rejects that there actually exists 100 ft. of saturated alluvium at the site location.

95. Section 5.6.3, page 147, first paragraph. The reference to “two” databases for wells is not entirely correct. This Section requires additional clarification. Revise to state: “The pre-1987 data was only available for wells that were geologically logged by the MDNR/MGS. Thus it is not a complete tabulation of all wells drilled prior to 1987—only those with geologic logs.”
96. Section 5.7, page 149, second paragraph in the section. Remove all the sentences in this paragraph starting with the sentence that states, “The current understanding...” Replace with the following statement, “For the purposes of this RI Addendum, the subsurface, self-sustaining, chemical reaction such as what has been occurring in the South Quarry of the Bridgeton Landfill since December 2010 shall be referred to as an “SSR” consistent with the North Quarry Administrative Settlement Agreement and Order on Consent, docket No. 07-2016-0005.”
97. Section 5.7, page 149, third paragraph. Remove this paragraph.
98. Section 5.7, page 150, first full paragraph. Revise this paragraph as follows, “Based upon recent observations, including settlement monitoring, the primary heat front SSR has moved through portions of the South Quarry, and currently appears to be most active in the southern portion of the South Quarry. Based on the sequencing of the settlement occurrences, the heat front of the SSR has migrated from an initial location in the eastern portion of the South Quarry in a counterclockwise direction to the north, then to the west, and, most recently, to the southern portion of the South Quarry. However elevated temperatures are still being measured in other portions of South Quarry. The EPA, in coordination with the MDNR, has required additional actions be taken in the portion of Bridgeton Landfill between the North Quarry and the South Quarry referred to as the “neck,” such as the installation of a heat extraction barrier which are discussed below.”
99. Section 5.7, page 150, second full paragraph. Delete this entire paragraph.
100. Section 5.7, page 150, third full paragraph. Delete this entire paragraph

Section 6. Nature and Extent of Radiological Impacted Materials (RIM)

101. Section 6, page 152, second paragraph. Revise the last sentence as follows, “For the purpose of this report, the mixture of soil and solid waste in Areas 1 and 2 that contains these radionuclides above concentrations defined later in this section is referred to as radiologically-impacted material (RIM).”
102. Section 6.1 Page 153, third paragraph. The discussion of the production of barium sulfate residues described in paragraph 3 is inconsistent with the EPA’s understanding of the reference document (Harrington, C. D. and Ruehle, A. E., 1959, Uranium Production Technology, Mallinckrodt Chemical Works, St. Louis, Missouri, Chapter 3). ~~Revise this paragraph as follows,~~ “The LBSR was derived from uranium ore processing at the Mallinckrodt facility in downtown St. Louis. The generation of the LBSR was described by Harrington and Ruehle (Harrington, C. D. and Ruehle, A. E., 1959, Uranium Production Technology, Mallinckrodt Chemical Works, St. Louis, MO, Chapter 3). The LBSR originated from Belgian Congo ore processed at the Mallinckrodt facility in downtown St. Louis. Once the ore was milled to reduce particle sizes, it was fed into a digester for intense leaching using hot, concentrated nitric acid. This resulted in a liquid nitric acid solution that contained soluble and highly mobile radionuclides. If the sulfate content of the ore was not sufficient, sulfuric acid would be added during this digestion to ensure the next treatment step would be effective. After filtration, the solution was then treated with

barium carbonate to cause sulfate precipitation which removes dissolved radium and lead along with other metals by co-precipitation of crystalline barium sulfate. This treatment step resulted in the accumulation of barium sulfate residues that contained radium and lead along with other metals. Removal of radium from the treated uranium ore served to reduce the exposure risk to the workers during subsequent processing steps, while the removal of lead and other metals reduced the formation of sulfate scales during later processing steps. A side effect of this co-precipitation is that some uranium (approximately two percent, consisting of mostly U-PO₄ and MoO₄ complexes) was also removed.”

103. Section 6.1, page 153, last paragraph, and page 154, first paragraph. Replace this paragraph which begins on page 153 and continues on page 154 with the following language, “These barium sulfate residues were then further treated with hot nitric acid and hot sodium carbonate- and sodium bicarbonate-based leaching to remove as much of the co-precipitated uranium as possible. The remaining solid materials accumulated from these acid and carbonate treatments were referred to as leached barium sulfate residues which indicated that the uranium was recovered to the extent possible. The LBSR present at the Site reportedly contained only approximately 0.05% to 0.1% of uranium (NRC, 1976 on page 2). Prior to 1966, these materials were stored by the Atomic Energy Commission (AEC) on a 21.7-acre tract of land in a then-undeveloped area of north St. Louis County now known as the St. Louis Airport Site (SLAPS) (EPA, 2008a, NRC, 1988 and RMC, 1982). The LBSR, along with certain uranium processing residuals, reportedly were moved from SLAPS to the nearby Latty Avenue site in 1966 (NRC, 1988).”
104. Section 6.1.1. Remove the first two paragraphs of this section providing commentary related to the EPA’s comments on a previous draft of this document. With regards to the chemical nature of the contaminants at Latty Avenue, information should be available from the DOE, one of the Respondents at the site, as well as, from the U.S. Army Corps of Engineer FUSRAP program which investigated contaminants remaining at the Latty Avenue Site after material was transported to West Lake. Several documents are available on the following website operated by USACE: <http://www.mvs.usace.army.mil/Missions/Centers-of-Expertise/Formerly-Utilized-Sites-Remedial-Action-Program/>.

It is clear, based on the fact that the Latty Avenue Site was remediated following removal of the materials discussed in this section, that some of the soils mixed with the LBSR as described in this section could have been contaminated by materials formerly stored at Latty Avenue. Furthermore, NRC inspections of the Latty Avenue Site performed on August 11 and October 20, 1976, concluded that levels of direct radiation exceeded NRC unrestricted use levels, and that the presence of some uranium and thorium process residues remained at the site (NRC, 1976, p.4). Provide additional information in this subsection, based on historical records including site remediation records, on the materials that were stored at the Latty Avenue Site including (1) the primary radionuclides present in each material or which were found in the remaining soils after the materials were removed, (2) any distinguishing isotopic ratios such as pairs of isotopes in decay chains that are out of secular equilibrium, as well as, (3) any pertinent information that could be used to better understand any radioactive contaminants that may have been present in the soils mixed with the LBSR and brought to the site.

105. 6.1.1, page 155, first and second bullets. While the aerial photo referenced does show a trench or cut into the surface of the pile, the reason cited in this bullet “to establish the depth of AM-7 pile subsidence” is not documented or verified. The interpretation from Randall Grip with Sero-Data Corporation, LLC states this is “likely test trenching operations to determine the remaining

material to be removed from the pile 1 area." Revise this bullet to match the language used by Mr. Grip and specifically reference his report. Similarly, for the second bullet, the aeriels cannot, by themselves, determine the reason why things were done; rather, they just document the conditions at the time. Revise the text in the report accordingly.

106. Section 6.1.1, page 156. Please delete the following words in the first sentence of the last paragraph: "Although no items of noncompliance with NRC requirements were found during a subsequent investigation of the West Lake disposal,"
107. Section 6.1.1, page 156. Revise footnote 62 or the text to further specify what "allowable level of 0.6 mR/hr" is based upon, i.e. NRC criteria established for decontamination of land areas prior to release for unrestricted use. Also, revise units for 0.6 to be mR/hr instead of MR/hr.
108. Section 6.1.2, page 157, first paragraph. Add additional text to this paragraph, and list examples of how radionuclides might be present in MSW in OU-1. Where possible, list specific materials and wastes that were brought to the West Lake Landfill. The EPA previously discussed information from CERCLA Section 104(e) responses, available in the OU-1 ROD Administrative Record, regarding materials sent to or placed in the landfill with the Respondents, and indicated this information could be found in the Administrative Record. Additionally, Finkbeiner (1989) seems to indicate possible sludge and petroleum materials were disposed at the site in "Aerial photographic analysis of the Westlake Landfill site, Bridgeton, Missouri: Lockheed Engineering and Science Company, Las Vegas, Nevada, 37 p." Add statements to this paragraph to include this information and the reference.
109. Section 6.1.2, page 157, second paragraph. This paragraph indicates there were 43,000 tons of soil mixed with LBSR disposed of in the landfill. However, the bullet at the top of p. 156 implies that there were 39,850 tons of soil mixed with 8,700 tons of LBSR for a total of 48,550 tons brought to the landfill. Revise the numbers, as necessary, for accuracy, or explain the inconsistency.
110. Section 6.1.2, page 157, second paragraph.
 - a. In the eighth line, add the word "Standard" before the word "operation."
 - b. In the tenth line, revise the statement "resulting in a relatively discontinuous layer," to say "resulting in multiple irregular, but somewhat continuous layers."
 - c. In the thirteenth line, revise the text to "... MSW Landfill is not necessarily a discrete definable horizontal layer, even when it is initially placed."
111. ~~Section 6.2, page 158. Revise this section to indicate that Preliminary Remediation Goals, or PRGs, were developed per relevant OSWER guidance and UMTRCA regulations to establish criteria to define RIM. Remove any references to previous feasibility studies and any associated statements of work.~~
112. Section 6.2.3, page 160, first full paragraph. For clarity and consistency with the OSWER directive 9200.4-18, revise the first sentence as follows, "The guidance further states that the combined exposure limits for the cleanup of radon decay products in buildings (40 CFR 192.12(b)(1) and 192.41(b)) are considered potentially relevant and appropriate requirements for sites with radioactive contamination..." Revise the last sentence after the semicolon as follows,

“this means that a higher value may be appropriate for commercial and industrial land uses at other sites only after a site-specific evaluation considering both the distribution and nature of contaminants determines the value will not result in risks above the CERCLA risk range of 10-4 to 10-6.”

113. Section 6.2.5, page 162, last paragraph. The first sentence of this paragraph states that background activities for all members of a decay chain were considered to be equal to the lowest value reported for any member in that decay chain. This sentence appears to be true for the background values selected for the thorium-232 and uranium-235 decay series. However, this statement does not seem to hold true for the selection of background values for the uranium-238 decay series. It appears that the uranium isotopes were grouped separately from the rest of the decay chain, and the lowest of the uranium background values for the uranium-238 decay chain was selected to set the background value. While it is true that the lower background value for radium-226 was conservatively applied as the background value for thorium-230, this value was not applied to uranium-234 or uranium-238, which are all members of the same decay chain. Revise this paragraph to correctly state how background values were determined for uranium isotopes.
114. Section 6.2.6, page 164, second paragraph. At OU-1, the definition of RIM serves as a set of criteria to sufficiently identify and evaluate contamination for the purposes of a remedial investigation. Further, OSWER Directive 9200.4-25 states on page 5, “It should be noted that to meet a permanent clean-up objective for radium-226 and radium-228 of 5 pCi/g, there needs to be reasonable assurance that the preceding radionuclides in the series will not be left behind at levels that will permit the combined radium activity to build-up to levels exceeding 5 pCi/g after completion of the response action.” Therefore, a PRG for uranium which included specific isotopes that precede radium-226 must be selected to ensure this condition is met. Beyond that, CERCLA requires that all remedial actions should prevent risks from hazardous substances outside of the acceptable risk range of one-in-one million to one-in-ten thousand. The review and comparison of uranium PRGs and clean-up goals developed at other sites in St. Louis are appropriate as long as these comparisons include recognition that these other values were determined using site specific parameters which may not be representative of OU-1 at the West Lake Landfill Site. Revise this paragraph to include a discussion related to the above quoted statement from OSWER Directive 9200.4-25. Remove any references to any previous feasibility studies or their associated statements of work from this paragraph.
115. Section 6.2.6, page 164, last paragraph. Cite the source of the 71 mg/kg mass equivalent for the 50 pCi/g uranium standard.
116. Section 6.2.6, page 165, first full paragraph. Revise this paragraph to incorporate the verbiage in ~~footnote 69 into the text.~~ Expand this discussion to include statements presented in OSWER Directive 9200.4-25 related to the reasonable assurance required for radionuclides that precede Radium-226. Evaluate whether total uranium criteria selected to define RIM will prevent unacceptable risks according to the revised BLRA for the site. The EPA notes the non-carcinogenic Regional Screening Levels (RSLs) for Uranium have been lowered to 16 mg/kg for residential exposures and 230 mg/kg for industrial worker exposures with a hazard quotient of 1. Revise descriptions of RIM, if necessary, considering that PRGs and RSLs have changed since the initial remedial investigation (2000). Remove the reference to the SFS work plan after responding to the other statements in this comment, and reconsider whether the referenced section of the OU-1 ROD for the St. Louis Airport Site, or SLAPS, is relevant.

117. Section 6.2.6, page 165, second full paragraph. Unless the site specific evaluations and ARAR related requirements utilized for the development of uranium remediation levels at the SLAPS and the St. Louis Downtown Site, or SLDS, were conducted by the respondents for OU-1 of the West Lake Landfill Site, this sentence should be revised so that it is consistent with other changes in this section required by the preceding comments.
118. Section 6.2.6, pages 164-165, and Section 9.4. The cleanup goals for the SLDS and SLAPS sites include 50 pCi/g for uranium-238 specifically and not for total uranium. All statements referring to these cleanup goals should be revised to clarify this as necessary.
119. Section 6.3, page 167, last paragraph.
- a. Fourth sentence. Please indicate that Borehole Summary Sheets were not prepared for well data from the NRC 1981 report. Also, include information on the nomenclature applied to designate these wells, including the distinction between wells labeled NRC vs. PVC, and where the corresponding data can be found.
 - b. Provide more detailed background as to how each data type was used to interpret the chosen intervals. For example, explain whether intervals are set on the peak of the gamma curves, or the slopes; explain if there a set buffer between a sample hit and the interval terminations; clarify if the determination of base counts for gamma or alpha was done quantitatively or qualitatively; and generally describe how these base count levels were determined. Provide some specific examples in the text that explain in detail how the intervals of RIM were identified for that specific boring. Also, clarify if Cotter analytical data was utilized when selecting the RIM interval.
120. Section 6.3, page 168, first paragraph. In addition to determining whether all samples which contain uranium above 54.5 pCi/g also contain combined radium or combined thorium above 7.9 pCi/g, perform the following evaluation: is combined radium (pCi/g) divided by 7.9 pCi/g or combined thorium (pCi/g) divided by 7.9 pCi/g (**whichever is greater**) plus total uranium (pCi/g) divided by 54.5 pCi/g greater than 1. For the set of samples for which the value determined from this evaluation is greater than 1, identify any samples that do not contain either combined radium or combined thorium greater than 7.9 pCi/g. Incorporate the results of this evaluation in this paragraph. This type of sum of ratios evaluation for radionuclides is similar to how data were evaluated for the SLDS site. The results of this evaluation for OU-1 of the West Lake Landfill site can be used to further demonstrate that the definition of RIM for uranium is conservative and consistent with OSWER directives discussed in Section 6.
121. Section 6.4, page 168, first paragraph, second sentence. Table 6-5 indicates that there are additional wells in Area 2 that have multiple discrete RIM intervals that are not listed (NRC-21, ~~and NRC-22~~). ~~Include these wells in this list. Also, indicate where the data for these wells can be found since they are not included in Appendix L.~~
122. Section 6.4, page 168, second paragraph of the section. Expand on the discussions in Section 6.3 and the comments to Section 6.3 provided in this letter to explain how the intervals of RIM were identified in Appendix L and in Tables 6-4 and 6-5. This discussion should include a general description of how the base count levels for the gamma and alpha field measurements were determined. Please specify whether these base count levels were determined for an individual investigation, instrument, or specific boring. Please clarify that the calculations performed in the

paragraphs following the second paragraph utilized the occurrences of RIM specified in Tables 6-4 and 6-5 and did not utilize the estimations determined from Appendix P.

123. Section 6.4, pages 169-170, last two paragraphs of the section. Revise these paragraphs by rearranging all the evaluations utilizing historical aerials for Area 1 together and similarly for Area 2. The discussions related to fill for both areas should include an acknowledgement of the materials brought to the site between 2006 and 2008, and incorporate the 2005 aerial surface elevations. Finally, compare the information summarized in these paragraphs with the identified occurrences of RIM and evaluate whether there are any major inconsistencies between the historical information and the radiological data or measurements. Incorporate this information into this Section and Section 9 when discussing the CSM.
124. Section 6.5, page 170, first paragraph of the section. Revise this section as necessary after responding to the comments provided for Appendix P of this document. Also, revise the reference to the S.S. Papadopoulos report by specifying Appendix P of the RIA, if appropriate.
125. Section 6.5, page 171, second paragraph. Expand the discussion in this paragraph related to the grid size utilized for the three dimensional extent of RIM, i.e. why were the grid blocks reduced from 10 meters by 10 meters to 5 meters by 5 meters. Provide the output for the 10 meter square blocks so relative sensitivity of altering grid size can be compared.
126. Section 6.5, page 171, third paragraph. After the first sentence, which references Figures 6-12 and 6-13, add a sentence that clarifies that surface gamma scans are not depicted on these figures, and therefore, the borings depicted on the figures may not identify the full extent of RIM. Further clarify that flattening the 3-dimensional extent of RIM into a 2-dimensional surface results in more jagged boundaries of extent of RIM and small irregularly shaped "islands" of RIM and non-RIM materials. Finally, clarify the estimated precision of these irregularly shaped estimates of the extent of RIM.
127. Section 6.5, general. Wherever RIM has been estimated to be present based on field measurements of gross gamma or alpha radiation, globally state that these measurements have been used to provide an indirect indication of potential RIM occurrences. The EPA notes this is consistent with descriptions provided in section 6.3 of this RIA.
128. Section 6.5, page 171, second full paragraph, 7th line. Insert a sentence after, "... depths within Areas 1 and 2" that states, "Figures 6-12 and 6-13 also show the highest concentrations of radium and thorium detected at any depth in sampled borings, surface gamma activity interpreted as RIM, and borings determined to have RIM present based on downhole and/or core gamma scans."
129. Section 6.6., page 172, first and second paragraph. Expand this discussion to summarize what data failed to pass the data usability evaluation and why. Also, indicate on tables 6-2 and 6-3 any data that failed the usability analysis. Add a footnote to these tables that explains the relationship between the data presented and how it has been utilized in the RIA similar to footnote 1 on page 1 of Appendix D-12, i.e. the BLRA and Appendix P.
130. Section 6.6, page 172, third paragraph. The EPA does not agree with the third sentence of this paragraph. A 95% upper confidence limit, or UCL, is not invalidated simply because the data set being evaluated may be bimodal. The EPA provided specific comments and guidance on the use of Pro-UCL and subsequent selection of appropriate exposure point concentrations based on a

variety of factors along with our comments to the updated BLRA. Revise this statement by indicating that the selection of appropriate 95% UCL values was in accordance with applicable EPA guidance. Clarify in the text that the data utilized to calculate these EPCs and the associated output from ProUCL is included in the BLRA. Provide a reference to the appropriate attachment in the BLRA.

131. Section 6.7, page 173. Add discussion regarding the origin of the radionuclides that were deposited onto the Buffer Zone Property, i.e., where they were located on Area 2 prior to the erosional deposition offsite. If the berm did not “fail” and erosion of the berm itself caused RIM to migrate onto the buffer zone area, then presumably there were radionuclides present on or in the berm. The presence of any such RIM on or in the berm must be accounted for in the CSM. Also see related comment in Section 7.3.2.1.

Section 7. Radionuclide Occurrences in Environmental Media

132. Section 7.1.1.1.1, page 178. Remove the last sentence in the partial paragraph at the top of the page, and the last sentence in the first full paragraph.
133. Section 7.1.1.1.2, page 178, last paragraph, first sentence. Revise this sentence to state that the radon flux was measured again after the construction of the NCC was nearly complete. Add a sentence that states that at the time of these flux measurements, two identified areas needing cover along the eastern and northwestern slopes of Area 2 had not been installed, and required vegetation sampling had not been conducted to determine if additional cover construction is required. In addition, add the grid spacing and representative area measurements in this section consistent with what was provided for the previous radon flux texting in section 7.1.1.1.2.
134. Section 7.1.1.2, page 179, first paragraph of the section. Because the Area 1 disposal cell lies beneath a portion of the Bridgeton Landfill wastes and RIM has been identified in a portion of this part of Area 1, add vertical movement to the statement that discusses the lateral movement of radon.
135. Section 7.1.1.2, page 179, fourth paragraph. The paragraph states that stack samples for radon-222 were evaluated relative to probable risk, and it was concluded that “recent measurements... are nearly 10 times below the recommended EPA regulatory limit of 0.03 working level for indoor exposure”. Revise this paragraph to state that the stack samples were evaluated relative to the EPA regulatory standards. Add to this section, a summary of where within the stack and how these samples were collected. Include any information about the operating parameters of the gas collection system at the time of the collection of these samples, if available.
- ~~136. Section 7.1.1.2, pages 179-180, paragraph at bottom of page 179 and top of page 180. Delete all text following the first sentence.~~
137. Section 7.1.1.3, page 180, last paragraph, first sentence. Clarify what is meant by “on the order of” 0.5 pCi/L or less. Include the maximum annual average out of the thirteen stations.
138. Section 7.1.1.3, page 182, last paragraph. Provide additional description of the natural radon-222 and corresponding lead-210 washout in sediment and drainage areas.

139. Section 7.1.2.1, page 183, first full paragraph. Most of the statements in this paragraph seem to repeat what is stated in more detail in the previous paragraph on page 182. Delete the first two sentences of this paragraph as these statements are already specified in the previous paragraph. Incorporate the last sentence into the previous paragraph where appropriate.
140. Section 7.1.2.1, page 183, second full paragraph. In the second sentence, replace the "at or near" with "near or in some cases below." Delete the sentence that begins with "Overall." According to the results presented in Table H-2 for these two sets of samples, all radionuclides reported had at least one non-detect except for Thorium-230 and Thorium-228. Because the differences between some of the thorium results were greater than 300%, the conclusion in the last sentence is not well supported. Revise this paragraph to focus on the limitations of evaluating an entire exposure pathway based on four samples (two from Area 1 and two from Area 2) whose results consist of more than 50% non-detects.
141. Section 7.1.2.1, page 183, third full paragraph. Replace the phrase "a slight increase" in the second sentence with the actual percentage that the downwind location was increased over the upwind location. Add a sentence that states differences between upwind and downwind locations could not be determined for uranium-238 and uranium-234. Add "and were therefore not detected" to the end of the sentence discussing the U-235 results. Add the following sentence, "Because all of the results were non-detects, any differences between upwind and downwind sampling locations cannot be determined." Revise the sentence discussing the Th-232 decay series to specify Thorium-228. Add a sentence to specify that the same relationship appears to exist for Ra-228 in Area 2 only. Add a sentence that specifies differences could not be determined for the rest of the radionuclides in the Th-232 decay series. Revise the sentence that begins with "Based upon the results ..." as follows, "Based upon the results of the fugitive dust samples, radionuclide transport and its significance cannot be determined for most radionuclides in Area 1." Add the following sentence, "However, there did not appear to be significant transport of Th-230 or Th-228 via fugitive dust in Area 1 at the time of the sampling." Revise the sentence that begins with "There may have been ..." as follows, "There may have been some radionuclide transport of Th-230 and Th-228 via fugitive dust occurring within Area 2 in 1996 at the time the 1996 samples were collected; however, due to the number of non-detects and detections with MDAs and errors greater than 50% of the results, radionuclide transport and its significance cannot be determined for most radionuclides."
142. Section 7.1.2.1, page 183, last paragraph. Add the words, "radiologically impacted" before fugitive dust emissions in the first sentence. Clarify what is meant by "the absence of increased levels" in the second sentence. The EPA notes that the respondents stated in their response to comment 159 to the EPA's previous RI Addendum comment letter that, "We do not believe it would be appropriate to compare these 8-hour duration sample results obtained within Areas 1 and 2 in 1995 to background levels obtained by EPA twenty years later." Clarify whether the respondents compared the 28-day continuous monitoring results collected at the 13 monitoring stations around the site to the four 8-hour samples collected in 1995 on Area 1 and Area 2.
143. Section 7.1.2.2., page 184. The first paragraph indicates the concentration of gross Alpha from the 13 on-site monitoring stations were 3 to 4 times higher than the concentrations from the EPA's off-site monitoring program, and then precedes to list some of the potential reasons for these differences. Add the following sentence, "However, isotopic results for samples collected at the 13 monitoring stations that correspond the primary contaminants of concern in OU-1 of the West Lake Landfill were compared to the EPA off-site sampling and relative standards." Similar to the gross alpha results, provide a quantitative approximate of the differences in the gross beta

results, i.e. while the median gross beta results from each of the 13 on-site stations were above all the median results obtained from each of the EPA's off-site stations, the results were within 44% of the median result from the EPA designated background station.

144. Section 7.1.2.2, page 184, second paragraph in the section. Delete the sentence that begins with "As expected." All of the West Lake OU-1 radiological COCs are naturally occurring. Delete the sentence that begins, "In almost all cases..." Replace with the following statements, "The maximum value for Th-230 reported from each of the 13 on-site stations is below the median value of Th-230 determined at the EPA's off-site reference station (Table 7-7). The maximum value for U-238 reported for from each of the 13 on-site stations is below the median value of U-238 determined at the EPA's off-site reference station (Table 7-8). The maximum value reported for total radium from on-site stations 5, 6, 11, and 12 are above the median value for total radium determined for EPA's off-site reference station. However, all the median values reported for total radium from all 13 stations are below the median value for total radium determined at the EPA off-site reference station (Table 7-9). The summary statistics for all the particulate and radon sampling associated with the EPA's off-site air monitoring are provided in Table 7-10."
145. Section 7.2.1, page 188. State whether the lab results discussed in the two paragraphs on this page were filtered or unfiltered samples.
146. Section 7.2.1, page 188, last paragraph in the section. Revise this paragraph by first acknowledging that samples were also analyzed for thorium isotopes. Not mentioned in this paragraph at all are any of the results for Th-232, Th-230, or Th-228. Similar to the previous paragraph which discusses Area 1 results, add a discussion for Area 2 samples that includes these thorium isotopes. Also, the statement which lists several radionuclides whose minimum detectable activities were all greater than 10 pCi/L is simply incorrect for U-235 and misleading for other radionuclides, as some of the samples collected by EMSI in 1997 do not have the same elevated MDAs. For instance, Ra-228 has an MDA less than 10 pCi/L for weirs 5, 8, 9, and 10. Revise this statement to include the evaluation of both the McLaren/Hart and EMSI samples to include U-235. Add statements that discuss the detections of the various radionuclides for which the MDAs were greater than 10 pCi/L, i.e. Th-234 at Weir 5 and Pb-210 at Weir 8.
147. Section 7.2.2, page 189, second paragraph. In the second to last paragraph of the section, add the following statement, "All of these samples were collected without filtering."
148. Section 7.2.2, page 189, third paragraph. The EPA is unaware of background levels being established for any radionuclides in stormwater at the site. Delete this statement or provide the details for how background levels of radium and uranium were determined for stormwater and include those levels in the text. Provide the estimated total uranium mass calculated for the April 2016 sample from outfall NCC-002. Explain why respondents decided to analyze samples for total uranium after this estimate. Finally, similar to the discussion of the original RI stormwater sampling, include a discussion of the results for the thorium isotopes.
149. Section 7.2.3, page 189, third paragraph in the section. Provide a reference to where the gross alpha measurements obtained in 1997 are presented in the RIA. Also, add paragraphs to discuss the Uranium and Thorium results from the surface water samples similar to the evaluations conducted in the previous sections. Include in this discussion, a relative comparison of the concentration found in the associated weirs with the appropriate surface water sample.

150. Section 7.2.4, page 190, first and second paragraphs in the section. Revise these paragraphs, where appropriate, to be consistent with the description of stormwater flow provided in the first paragraph of section 7.2.3 which described that the northwest portion of area 2, the Buffer Zone, and Crossroads Lot 2A2 could potentially flow into the flood control channel along the west and southwest side of old St. Charles Rock Road.
151. Section 7.2.4, page 190, last paragraph. Revise this paragraph by stating what levels the rainwater/stormwater runoff samples were compared to from which the determination that the results were relatively low was made. This should include levels for total uranium, total radium, and Th-230. Finally, summarize the comparisons and evaluations conducted in section 7.2.3 to determine whether impacts to any surface water bodies have occurred and whether those impacts are significant. If necessary, revise the statement that begins, "Given the relatively ..."
152. Section 7.2.4, page 191, last sentence in the section. The EPA agrees that the installation of the NCC reduces potential for stormwater contact with RIM, and subsequent transport of RIM via runoff. Because no comparison of the 2016-2017 stormwater results to any other data collected to date was conducted, the EPA is unaware how the respondents have determined that the current stormwater monitoring results support this conclusion. Add the appropriate comparison or other details to support this statement to section 7.2.2 or delete this statement.
153. Section 7.3, page 191, last paragraph in the section. The EPA notes that the work plan for the installation of the non-combustible cover over portions of Area 1 and Area 2 does not specify that sediment samples must be collected. Table 7-12 is titled as "2016-2017 Sediment Sample Results," and doesn't appear to summarize the OU-1 RI field investigation results. Revise the title of this table, and include all the sediment results or reference the appropriate separate summary table.
154. Section 7.3.1.1.1, page 192, bottom paragraph. Replace the parenthetical phrase in the fourth line with, "... , as defined in Section 6.2."
155. Section 7.3.1.1.2, page 193, second paragraph. The first sentence of this paragraph states that sediment samples from weirs 5, 6, 7, and 9 all exceeded the RIM definition for combined thorium. However, the last sentence of this paragraph states that sediment sampling results did not indicate that sediment transport from Area 2 was occurring during the RI field investigations onto the Ford property. Clarify in this paragraph how this conclusion was determined.
156. Sections 7.3.1.1.1, 7.3.1.1.2, and 7.3.1.2, pages 192-194. The discussion on sample results only discusses results in terms of above or below the RIM definition level, but doesn't actually state the results. State the concentration or range of concentrations detected above the definition of RIM so it is clear how much higher than the 7.9-pCi/L concentration is present. This is important for nature/extent determination
157. Section 7.3.1.2, page 195, top of page, last sentence.
 - a. Replace the word "near" with "above" in the last sentence comparing Pb-210 to the PRG.
 - b. This sentence states potassium-40 is not a known contaminant at the site; however, if it is detected above the PRG, that should be clearly stated.

- c. State which exposure scenario the stated PRG is relative to (i.e., residential, occupational, etc.), and state the date the PRG was taken from the online calculator or associated published tables.

158. Section 7.3.2.1, page 195.

- a. Clarify in the first paragraph where or when the historic slope failure theory was presented and when it was revised.
- b. Section 7.3.2.1 and section 7.3.1.1.2 both contain discussion of soil erosion from area 2 and transport down the berm onto the Buffer zone. Discuss the likelihood that the berm itself contains radionuclides which could have been mobilized onto the Buffer zone. Include discussion of any evidence that supports or refutes this possibility, including aerial photos, sample collection and analysis, gamma surveys, etc. A cross-sectional figure illustrating the general topography of the berm and properties on either side would assist the reader in understanding erosion associated with the berm. If the berm is possibly the source of the radionuclides that eroded onto the Buffer zone, please revise the text so as not to preclude this possibility in sections 7.3.1.1.2 and 7.3.2.1 and any other area this topic is discussed. This information is also pertinent to the CSM.

159. Section 7.3.2.1, page 197. Please add the statement to the end of the last bullet, "... , provided the rock buttress is maintained."

160. Section 7.4, page 197. Remove the word "former" when discussing the seep. Field inspection confirmed that it still exists.

161. Section 7.4, page 198, last sentence in top partial paragraph. Qualify the statements regarding the seep inspected in May of 2017 by indicating that the seepage appears to remain localized. Add the following phrase to the end of the last sentence, "however, the regular status or nature of this seep is unknown because the area is highly overgrown and has not been inspected regularly."

162. Section 7.5.1, page 201, first paragraph. The last part of this paragraph mentions wells "upgradient" of Areas 1 and 2. The EPA previously requested in General Comment III to the draft RIA, that gradient comparisons using wells with known or potential leachate impacts should be avoided. Any well on-site or along the perimeter of Areas 1 and 2 is potentially affected by a variety of site activities. Revise text to delete the terminology "upgradient." Suggest use of terms such as south, north, northeast perimeter, and other appropriate terminology to generally geo-geographically identify the well locations, as appropriate.

Sections 7.5.1, 7.5.2, and 8.74. Discussing isotopic ratios (i.e., Th-230/Th-232; Ra-228/Ra-226) in these sections for groundwater results (and sediment and leachate) may help differentiate RIM impacts from naturally occurring radionuclides. The ratios should be significantly higher in Th-230 or Ra-226 than Th-232 or RA-228 for RIM.

163. Section 7.5.1.1.

- a. Page 201. The reference to "background/upgradient" levels of Ra relative of Areas 1 and 2 should be revised to simply indicate "background" levels. Delete "upgradient."

- b. Page 202, first paragraph. Delete the second to last sentence beginning with, "Some of the data described in these reports may reflect water quality within the Missouri River alluvium but they may also reflect bedrock...", as the only data from these reports listed in the paragraph is alluvial groundwater data from Kleeschulte, 1993. True, these report contain other data and from other bedrock units, but that is not discussed/referenced in this paragraph.
164. Section 7.5.1.1.2, page 203, first, second, and third paragraphs. This is repeated from section 4.11.5, page 80, and is not entirely correct. See comment on previous section, Section 7.5.1.1, and revise this section by deleting statements accordingly. Also, remove the repeated text in one of these locations. First sentence, add the word "private" in front of bedrock wells to be consistent with term "private bedrock" wells used in the later part of the paragraph.
165. Section 7.5.1.1.3, page 204.
- a. As requested in the EPA's previous comment letter, General Comment III, remove the term "upgradient" from the sub-heading title and from within the text.
- b. First paragraph. Remove the phrase "or at a significant distance cross-gradient," as this is not used in the table and is confusing and not specific. Also remove "cross gradient" elsewhere in this section such as in Paragraph 4. Suggest referring to general location as south or southeast of the site or southeast of the Bridgeton Landfill.
- c. The EPA recommends showing radium results from monitoring wells on a Figure and referencing it. Figures provide a much easier means for understanding the site conditions than the text.
166. Section 7.5.1.1.4, page 205 and 206. This section incorrectly references the St. Louis Limestone, rather than the St Louis Formation. Revise for consistency with text in Section 5.
167. Section 7.5.1.1.4, page 207, first paragraph. Add a sentence at the end of this paragraph that states, "Previous interpretations and conclusions regarding radionuclides in groundwater will be re-evaluated and potentially superseded based on additional data and information collected during the OU-3 RI/FS."
168. Section 7.5.1.1.4, page 207, first paragraph. The Ra228/226 ratios listed for the alluvial and bedrock at the West Lake Landfill site are incorrect. The values listed are actually for background alluvium and bedrock groundwater. The correct ratios are 0.59 – 25.8 for the alluvium, and 0.097 – 10.7 bedrock. Revise this paragraph to use the corrected ratios, and specifically reference Conclusion #9 of the updated June 10, 2015, version of the "Background Groundwater Quality, Review of 2012–14 Groundwater Data, and Potential Origin of Radium at the West Lake Landfill Site, St. Louis County, Missouri." This report can be found online at <https://semspub.epa.gov/work/07/30265997.pdf>.
169. Section 7.5.1.1.5, page 207. There is no reference to where or how these background ranges were developed. Remove this section from the RIA, and move the last sentence of the section to the end of the previous section.
170. Section 7.5.1.2, page 208. This section uses the terms "upgradient or cross gradient" wells. Revise according to the original EPA General Comment III. The grouping of wells should be

revised to remove the “upgradient” and “cross gradient” groupings. Revise terminology to describe wells geo-graphically (south, north, northwest, etc.) or as other descriptive terminology.

171. Section 7.5.1.2, page 208 fourth paragraph, beginning with Table 7-18. This paragraph makes mention of “significantly higher” when it appears no actual statistical test of significance was done. There is mention in the previous section of significant difference that was associated with an actual statistical test. Replace the word “significant” in this and other areas of this section, or add the specific type of statistical test used.
172. Section 7.5.1.2.1, page 209, fourth paragraph. Per previous EPA general comment, remove the phrase, “both of which are upgradient of Areas 1 and 2,” in the first sentence, and refer to these locations “as removed” from Areas 1 and 2.
173. Section 7.5.1.2.2, page 210.
 - a. Second paragraph, first sentence. Per previous EPA general comment, remove the phrase, “both of which are upgradient of Areas 1 and 2.”
 - b. Last paragraph. Remove “and/or colloidal material” from the last line of this paragraph because colloidal material, by definition, would not be completely captured by the 0.45 um pore size filter used to filter the samples. Remove this phrase when used elsewhere, such as on page 211.
174. Section 7.5.1.2.3, page 212. Delete the last bullet on the page. There is not enough data and information on which to base this conclusion at this time. These issues will be addressed in OU-3.
175. Section 7.5.1.2.3, page 212. Delete the fourth bullet. This comment is not consistent with the stated purpose for these bullets of explaining potential reasons for the increase in the number of wells with radium above the MCL. Also, the general comment on groundwater discussions in the EPA’s comments on the previous draft version of the RIA document specifically indicated conclusions should not be drawn based on gradient determinations (upgradient/crossgradient) and without further information about leachate impacts in wells. The nature and source of radium impacts in groundwater will be evaluated as part of the OU-3 RI/FS and are not appropriate for inclusion in this document.
176. Section 7.5.1.2.4 second paragraph, Figures 7-5 through 7-12.
 - a. In paragraph 2, the fourth sentence states that the low correlation coefficients indicate that the trends are not “statistically significant.” Correlation coefficients are a measure of the strength and whether the correlation is positive or negative, but are not a measure of statistical significance. This sentence needs to be revised to state that the lower correlation coefficients do not demonstrate a strong positive correlation.
 - b. The last sentence of paragraph 2 states that “levels of Ra-226 in groundwater at this location have remained relatively constant over the time period.” Based on Figures 7-5 through 7-12, and the poor correlation discussed in the comment above, the EPA does not agree with this statement. Further, the EPA believes that this analysis demonstrates that there are insufficient data to establish trends for radionuclides in groundwater. This issue

will be addressed in the work to complete the investigation and evaluation of potential groundwater actions for OU-3. Delete this statement.

177. Section 7.5.1.2.4, second paragraph, and Figure 7-9.
- a. A general observation on all of the figures discussed in this section is that the CSU for the pre-2000 samples seems much smaller than the post-2012 samples; yet earlier in the text, there is mention of “improved” analytical methods. Perhaps, were the CSUs of the earlier samples calculated in a different manner or using a different metric than the later samples? Explain this oddity in the data.
 - b. Last paragraph. The last line again mentioned radium concentrations within the range of reported background at other radiological St. Louis sites that is not consistent with these other sites having different geologic units, and does not reference background data collected near the West Lake Landfill site that is presented in this report. Delete this statement in the last line of the paragraph; and revise to state that site specific background ranges will be established under OU-3. Furthermore, revise existing text to specifically note that the West Lake Superfund Site and the other radiological sites in the general area in do NOT share the same geologic units.
178. Section 7.5.1.3.2, page 216 and Appendix F-7. Clarify whether sample results in Table 1 of Appendix F-7 are of untreated, treated leachate, or both.
179. Section 7.5.1.3.3, second paragraph.
- a. The statement, “it is clear that reducing conditions exist within and adjacent to the North and South Quarry portions” needs to be supported by additional evidence other than the cited 7 ORP measurements. Revise the text to present more items supporting this statement, such as the low pE and the reported concentrations of Fe, Mn, SO₄, NO₃/NH₄. Also add the word “can” to the last sentence in this paragraph that references Ra concentrations “can” increase under reducing conditions. Additionally, add a reference where the data for Fe, Mn, SO₄, NO₃/NH₄ is presented in the RIA.
 - b. Last paragraph. Here and on other pages of the revised RIA, such as p. 238, 243, etc., there is reference to Section 8.6.3, that does not exist. This seems to be referring to Section 8.7.3. Revise to Section 8.7.3 here and where appropriate.
180. Section 7.5.1.2.3, page 210, fourth bullet. Explain why only 14 of the 15 wells previously sampled for the OU-2 FS were sampled.
181. Section 7.5.1.2.3, page 212, third and fourth bullets. Clarify what is meant by greater analytical detections in the third bullet. Delete the fourth bullet.
182. Section 7.5.1.3.1, first paragraph. The radium isotopic ratio previously mentioned has been Ra228/226 not Ra226/228, as listed here. Also, the Ra228/226 ratio is ALL groundwater from the site does NOT deviate significantly from RIM, as implied here. Revise to state, “The ratios identified for Ra228/226 in most, but not all, wells at the site deviates from RIM.”
183. Section 7.5.2, second paragraph. Remove the reference to “upgradient/cross gradient from Area 1 and 2,” and where appropriate, and use general language as provided in previous comments related to this terminology.

184. Section 7.5.3, first paragraph. There is information regarding background levels of Radium in groundwater in the document; however, there is no mention of Thorium or Uranium levels identified from regional groundwater data. Present a brief summary of existing Uranium and Thorium data from "background" groundwater levels identified near the site and/or from other groundwater data collected in the general area. Also, Uranium is extremely redox sensitive, yet no mention of this is in section 7.5.3. Revise this section to include a statement regarding the redox sensitivity of Uranium, and per comment to Section 7.5.1.2.4, also note in this section that the geologic units at the site likely vary from the geologic units where the background levels of Radium, Uranium, and Thorium were identified.
185. Section 7.5.4, page 220.
- a. Provide additional detail on the third bullet regarding what is specifically intended by the use of the terms "recharge and discharge." Clarify if this is groundwater recharge, river discharge, or specific aquifer unit(s) recharge. This also is discussed on page 252 of Section 9.5, and should be clarified in both locations of the document.
 - b. Seventh bullet. The adequacy of the entire site groundwater network needs review, not just perimeters of Area 1 and 2. This is also on p. 253 of section 9.5. Revise this section, and section 9.5, to clarify that the site-wide groundwater monitoring network will be assessed to determine adequacy of the network under OU-3.
 - c. Section 7.6.4, page 224, second paragraph. Revise the second sentence to state, "Based on Laboratory testing... radionuclides can leach from RIM under certain conditions." Also revise the last sentence by deleting the words "potential leaching and."

Section 8 Non-Radiological Chemical Occurrences in Areas 1 and 2

186. Sections 8.2, 8.3, 8.4, 8.5, 8.6, and 8.7. List the specific compounds detected rather than grouping them as SVOCs or pesticides. Compare the non-rad constituents listed in the bullets of these sections with the regulatory limits so that the nature and extent of the non-rad contamination can be more readily understood. Clarify whether the data for all constituents detected above a regulatory level or MCL are presented on a figure, and if not, generate one.
187. Section 8.7.2, page 235. The 1993 Kleeschultee report and Miller and others (1974) discuss non-radiological constituents, and it would seem to be an appropriate reference for naturally large background levels of some of these constituents, such as Fe, Mn in the Missouri River alluvial aquifer and anoxic conditions in the alluvium. High Fe is one reason why the alluvium aquifer is not utilized more for drinking water supply. Revise to include this information and appropriate references.
188. Section 8.7.2.4, page 240, first paragraph. Revise text to include a statement(s) that SO₄ is important for inclusion as an indicator of landfill leachate and pE of groundwater.
189. Section 8.7.2.4.4, page 243. Include a reference for the general background concentrations for Br, I, and the low number of detections.

190. Section 8.7.3, page 244.
- a. Second paragraph. Replace the “less than 0.000 1)” in the last line with the correct p-value of “less than 0.0001.” Also, this sentence is repeated at the beginning of the next paragraph; delete one of these.
 - b. Some of the text in this section seems to be directly taken from the 2014 USGS report. Direct text must be indicated as such and properly cited; currently, it is not. Revise to resolve this issue.
191. Section 8.7.3, page 245. Delete the last sentence in the partial paragraph at the top of page 245.
192. Section 8.7.4, page 245. Revise the heading for this section by removing “Possible Radionuclide and.” Delete all text and bullets except the last two paragraphs of the section. Section 8 should discuss non-radionuclide compounds, and all the information related to radium presented in this section has been presented elsewhere in the document.

Section 9 Conceptual Site Model

193. Section 9. All revisions made to other portions of this RIA based on the EPA’s comments should also be accurately reflected in Section 9. Please revise Section 9 accordingly.
194. Section 9. In general, this section is more repetitive than necessary. If the details of a topic, discussion, and/or investigation have been provided in a previous section, that information can be referenced and condensed in this section to highlight the points pertinent to the CSM. The narrative in this section needs to create a supported CSM that can adequately explain where RIM is or is not expected to be located, and supports the limits of the investigative activity. Also, see the more detailed comment to Section 9.4.2.
195. Sections 9.2 and 9.3, pages 248-249. Include a reference for the stated “0-150 ft” thickness for alluvium. Additionally, add statements to resolve this thickness to the reported thickness of 120 ft. that has been identified west of the site (Herst and Assoc., 2005).
196. Section 9.3.1, page 249. This section describes the alluvial deposits as fine-grained, over-bank deposits overlying poorly sorted coarse-grained channel deposits. Add a statement that the presence of coarse grained channel deposits could cause contaminant migration through preferential pathways.
197. Section 9.3.2, page 249, first paragraph.
- a. Revise the text to state that the Missouri River is approximately 1.5 miles west of the site, rather than 2 miles.
 - b. Add a statement that indicates the entire site is on the geomorphic flood plain of the Missouri River. This is pertinent to the CSM.
198. Section 9.3.2, pages 249-250, fourth paragraph.
- a. The term “landfill” in the first line of this paragraph has not typically been used in this context. Revise to “the Site” to avoid confusion with the various landfills and landfill cells located at the site.

- b. Be more specific when describing wells. State where the nearest public water well or intake is located with regards to the site rather than just saying there are none near. Do not generalize by saying “overall” the wells are industrial or commercial. State where the nearest private water well is (approximately 1.5 miles north of the site or whatever is closer), state whether there are any lawn and garden wells in the site vicinity, and state where the nearest industrial and commercial wells are. Section 9.4.1, page 250, second paragraph. Delete the second half of the last sentence starting with, “and accordingly, the LBSR...”, including the cited reference (EPA 1987) which does not appear to directly relate to this discussion.
199. Section 9.4.1, page 251, first full paragraph. Delete this paragraph, as it is repetitive and unnecessary. It is already included in Section 9.2, and in sections 5 and 6.
200. Section 9.4.2, page 251. This section needs to be expanded to integrate the historical site conditions, past activities and associated timeframes to explain the distribution of RIM in the landfill, including discussion of where it is not located, and why. This section should present a narrative summary based on the facts and related assumptions (clearly identified as such) documented in previous sections of the RIA that supports the CSM in its efforts to explain the location and general distribution of RIM. Specifically, describe what is known and assumed regarding past site activities in r all areas of the landfill complex at the time the RIM materials were transported to the site, stockpiled and used or placed, including the status of areas with regards to whether they were still accepting waste, were dormant or had a final cover, or were being actively quarried. Use this information to explain why RIM is located in Areas 1 and 2, and why it has not been identified nor is expected in other areas of the site. Discuss information or assumptions regarding how the material brought from Latty Avenue was handled and used; including where it was potentially stockpiled; how it was loaded and transported on site, how it was used as daily cover, how daily cover was typically applied to the landfill, estimates of the amount of daily cover needed in 1973, and whether the Latty Avenue material could have been used for any other purposes (i.e., final cover in areas, berm material). Expand the CSM if necessary to explain how RIM material ended up at the surface of the landfill (final cover?) and potentially on the berm; how RIM migrated (eroded) from berms located at the north western edge of Area 2 onto the buffer zone/Ford property, and how RIM became buried under the more recent MSW in the North Quarry (muffin top).
201. Section 9.4.3, page 251. Update this section, as appropriate, based on previous comments related the berm erosion and the buffer zone.
202. Section 9.5, pages 252-253.
- a. Revise the section 9.5 heading title by adding, “and other contaminants” after radionuclides.
 - b. State specifically whether any volatile compounds or other non-radiological contaminants have been detected above regulatory levels in the groundwater in OU-1.
 - c. Add a bullet to the list of potential data gaps for Leachate chemistry and occurrence.
 - d. Revise the last sentence of this section by replacing the phrase “used in the development of” with the words “conducted during.”

- e. The first sentence incorrectly states, "Radionuclides in the groundwater are discussed in terms of three isotopes: Radium, Thorium, and Uranium." These are elements, not isotopes. Revise to state, "... isotopes of three elements..."
203. Section 9.6. Revise this section to also include a brief discussion and references as to how these potential migration transport mechanisms are and have been mitigated and/or monitored by site actions. The revisions should include a few paragraphs to briefly summarize how the NCC, the air monitoring, the stormwater monitoring, and other site actions have provided information regarding the nature of site contaminants, potential contaminate migration pathways, and have supported risk evaluations.
204. Section 9.6.1, page 253. Please note if volatile emissions (i.e., from organic compounds) were considered, and the justification for elimination of this pathway. This should be consistent with the information presented in the BRA.
205. Section 9.6.1.1, page 253. Update this section by including 1) discussion of early radiologic surveillance reports that indicated accumulation of radon gas above applicable limits in a butler-type building on site, 2) discussion of future projected radon emissions based on no remedial action occurring. For consistency with the first paragraph, reference the UMTRCA standard when discussing 0.5 pCi/L in the second paragraph. Add a discussion of radon time-of-flight considerations in this section.
206. Section 9.6.1.2, page 254, first paragraph. The comparison of results says there were "few if any differences ..." Add discussion to elaborate on the few differences.
207. Section 9.6.1.2, page 254, second paragraph. The last sentence is inaccurate at this time because the slopes have not been covered with the NCC at this time. Revise accordingly.
208. Section 9.6.2, page 254. It is not accurate to state that the stormwater transport pathway is currently incomplete "due to the NCC cover." Revise this sentence to state, "Therefore, although dissolved or suspended sediment transport in rainwater runoff is a potential pathway for radionuclide migration from Areas 1 and 2, construction of the NCC reduces the potential for stormwater transport of radionuclides from Area 1 and 2." A statement should be added about the results of current stormwater monitoring events.
209. Section 9.6.3, page 254. Add discussion to this section regarding the analytical results from the fate and transport samples which confirmed that RIM material can leach under certain conditions. Indicate the extent to which leaching is occurring in OU-1, and that the potential for migration of any leached material will be evaluated in OU-3.
210. Revise this section and related bulleted item to generally include the information presented earlier in the leaching section related to RI. That modeling indicating a potential for leaching of RIM from Areas 1 and 2, and that information should be clearly added to this Section.
211. Section 9.7, page 254. It is recommended that discussion of the BLRA be broken out as separate section, not just presented as subsections of the CSM section.

212. Section 9.7.1, page 255.
- a. First Paragraph. Please revise the last sentence of this paragraph to state, "Lot 2A2 is fenced and access to this property is monitored by AAA Trailer. It is only accessible to the general public via trespassing, but is accessed by AAA Trailer workers.
 - b. Section 9.7.1 needs to be revised to better reflect the receptors as presented and discussed in the Updated BLRA. It might be better and more clear to discuss potential current receptors in the first paragraph and future receptors in the second paragraph.
213. Section 9.7.1, page 255. Second paragraph. Add a statement that explains unacceptable risk could occur prior to 1000 years in the future.
214. Section 9.8, page 255. The BLRA report should be appropriately referenced (title, date).
215. Section 9.8, page 255. The actual risk numbers should be presented, as opposed to just stating above or within CERCLA acceptable risk range.
216. Section 9.8.2.
- a. Page 256. Paragraph 2 refers to an uncertainty section. Need to be clear that section is not in the RIA, but in the BLRA report, which is not attached to this RIA.
 - b. Page 256, paragraph 2. State the actual cumulative risk numbers, and state all the contributors to the HI's greater than 1, not just the primary contributors.
 - c. Page 256, last paragraph. Please clarify what "direct contact with radium-226" entails (i.e, the gamma pathway, or inhalation/ingestion, or a combination of all pathways).
 - d. Page 257, last paragraph. The last sentence should state ".... risks to off-property receptors are within the EPA's acceptable risk range"

Section 10 References

217. Add the following references to Section 10:
- Owens, W.G., 1960, Occurrence of mineralized groundwater in southern St. Louis and Jefferson Counties, Missouri: Columbia, Mo., Master's thesis, University of Missouri, 99 p.
 - Miller, D.E., Emmett, L.F., Skelton, J., Jeffery, H.G., and Barks, J.H., 1974, Water resources of the St. Louis area, Missouri: Missouri Geological Survey and Water Resources Water Resources Report 30, 122 p

Figures

218. Figure 3-6. Review the boundary for the North Quarry portion of the Bridgton landfill, as it appears to extend into St. Charles Rock Road. Revise as appropriate.
219. Figure 3-7. The font for the permit numbers is very difficult to read. Revise the figure so the permitted areas are more legible.

220. Figure 5-8. The St Louis Formation is labelled on this stratigraphic column as the St. Louis Limestone. Revise to St Louis Formation for consistency with text in Section 5.
221. Figures 5-9 and 5-10. The EPA recommends the location of the Quarry wall be presented on these figures to help define the limitations of waste placement for the CSM.
222. Figure 5-16. The St Louis Formation is labelled as the St. Louis Limestone in the geologic legend on this figure. Revise for consistency with text in Section 5.
223. Figure 5-19. The title "registered wells" is not correct for these pre-1987 wells. These are wells that have geologic logs by the Missouri Geological Survey. The post 1987 wells are more accurately referred to as "registered wells." Revise.
224. Figures 6-12 and 6-13. Revise these figures to illustrate some of the input data used to generate the extent of RIM. Add the highest concentration of thorium and radium detected in each boring and the depth at which it was detected; add shading to depict surface gamma data that has been interpreted as RIM; and color code boring locations based on whether downhole or core gamma scans have been interpreted as RIM present or not present. These figures may need to be presented as plates to include all the data.
225. Figures 6-12, a and b, and 6-13, a and b. These figures are confusing to reviewers because there are many areas that are within the whole extent of RIM that are not shown for a particular elevation. For example, WL118 has contamination, yet in this series of figures, it is never highlighted yellow. Instead of showing RIM distribution in thin slices at specific 5 foot intervals, depict RIM distribution in 5-foot composite intervals from surface to 5', 6'to 10', 11'-15', etc., in order to avoid confusion from areas labeled as RIM which are not designated as yellow in any interval.
226. Figure 7-1. This figure does not include off-site resident/farmer as a potential exposure pathway. Please correct the figure to be consistent with what was evaluated in the BLRA.
227. Figures 7-13, 7-14. Figures are labeled as Combined Total Thorium, but the text above title block says "Uranium Explanation." It should state "Thorium Explanation."
228. Figure 8-2 is labeled Figure 7-12. Please revise.
229. Figures 8-6, 8-7, 8-8, 8-12, and 8-13. These figures show results for metals (iron, manganese, sulfate, and chloride) compared against screening levels listed as MCLs. However, there are no MCLs for these metals. The values listed are Secondary MCLs, or SMCLS, and should be listed as such.

Tables

230. Table 6-4. Revise the last footnote to also clearly direct the reader to the NRC data that is included in this table, which does not currently appear to be in Appendix L.
231. Remove the footnote regarding the EPA and the MDNR data validation from Tables 7-13, 7-24, 8-3, 8-4, 8-5, and 8-6. It is not accurate.

Appendices

232. Appendix D-6. Clarify whether Cotter sample results presented in this appendix include Matrix Spike samples, as is common practice. If not, explain why.
233. Appendix D-12, page 3 and top of 5. The data usability analysis concludes that uranium analyses which are reported on a mass basis (mg/kg) are removed from the data set used for the BLRA. EPA does not agree that isotopic specific analysis for radionuclides reported on a mass basis should be categorically rejected from consideration in the BRA and Appendix P.
234. Appendix D-12, Section 4, page 6. Prep batch 234716 corresponds to Test America job numbers 15607 and 15609. Although the text explains the lab issues that drive the exclusion of Th-230 from the BRA, namely blank contamination and poor tracer recovery, there is no laboratory case narrative or QC section to verify this. Include any pertinent case narrative and QC pages from the Test America laboratory reports associated with 160-15607 and 160-15609 as an attachment to this appendix.
235. Appendix D-12, Section 4.1, page 7. Expand the discussion in the second paragraph to include more details regarding why the prior aliquots from these samples could not be counted by the laboratory equipment. Explain how, if at all, this was related to the non-routine 'aliquot reduction' step performed by the laboratory on samples from Prep Batch #234716. Further, include details regarding the relationship between the 'aliquot reduction' of the analysis and the use or addition of the Th-229 spike. Clarify whether the use of this uncharacteristically high concentration of the Th-229 spike by the laboratory personnel was accidental or intentional. Finally, evaluate whether the concentration of the Th-229 spike used for the samples identified in Table 2 were significant enough to interfere with the measurement of Th-230 by alpha spectrometry.
236. Appendix D-12, Section 4.1.1, page 8. Add the following statements in front of the first sentence to the last paragraph of this section, "EPA evaluated these unusual or anomalous results utilizing the decay relationship between thorium-230 and radium-226 as a screening to identify whether further inquiry into the analysis of these samples was warranted. Because several of these results failed this screening, EPA requested that these samples be verified by an independent laboratory."
237. Appendix D-12, Section 4.1.2, page 8 and 9. Remove this section. Because the uranium ore was processed, the secular equilibrium relationship that would have existed in the ore may not remain after processing for a specific residue.
238. Appendix D-12, Section 4.1.3, page 9. The second sentence states that the EPA verification samples analyzed by SwRI are not directly comparable due to differing analytical methods between the two sample sets. EPA does not agree with this statement. Revise to be consistent with previous correspondence from EPA including the August 5, 2016 email from EPA to respondents regarding the final details of SwRI verification analyses.
239. Appendix D-12, section 4.1.4, page 9. The first paragraph discusses decay relationships between certain isotopes that do not appear to be confirmed by the results from samples associated with Prep Batch #234716. However, there is no discussion regarding any of the specific isotopes or decay relationships. Clarify in this section which predictive isotopes are considered to be inconsistent with the results from this Prep Batch.

240. Appendix D-12, section 4.2, page 10, second paragraph. Revise the first sentence to state the gamma spectroscopy analysis on the Cotter Samples relied directly on the low-energy gamma emission from radium-226 rather than ingrowth. Provide additional details about the uncertainty that occurs when this type of gamma spectroscopy is performed.
241. Appendix D-12, section 4.3, page 11. EPA has reviewed the radium-226 and lead-210 results from TestAmerica lab report 15607 and 15609. EPA has noted several instances where the Radium-226 analyses are very close to the gamma spectroscopy analysis for Pb-210 but the corresponding liquid scintillation counting (LSC) analysis is greater than an order of magnitude above those analyses. Further evaluate the Pb-210 data from all the TestAmerica lab reports associated with Cotter samples and revise this section as necessary.
242. Appendix D-12, Section 5, general. Add the 1996 Quanterra memos (Attachment A) as an attachment to this appendix. Also clarify what thorium-230 data from the McLaren/Hart samples was included in tables 6-2 and 6-3 and add a reference to Section 5 to the report that includes all the McClaren/Hart data for Th-230.
243. Appendix D-12, Section 8.2, page 16, first paragraph. Revise the sentence that begins, "Discussions with EPA ..." as follows, "...however, because of the reasons listed below, only the thorium-230 results determined by alpha spectroscopy should be used in the BLRA." Delete the word "Furthermore" from the next sentence.
244. Appendix D-12, Section 8.2, page 16, second paragraph. To prevent confusion with Section 7 of this appendix, add a qualifier to distinguish the paint cans referred to in this section from the previous section.
245. Appendix D-12, page 2842, Section 8.2, last paragraph. The text states that using aggressive digestion methods (EPA method SW846-3050B) for analyzing metals may yield higher results, especially for certain analytes such as barium, and that the Cotter samples analyzed by this method should not be considered in the BLRA as they might not be comparable to other metals results presented in the RI Addendum. The text further states that the SwRI lab utilized a more suitable "multiple step" digestion method. The 3050B method is the most widely used method in HTRW work. State the digestion method employed by SwRI, and discuss whether this is a widely used environmental method recognized by EPA and other environmental agencies. Incorporate the case narrative and QC sections in this appendix so the reviewers can verify and evaluate the digestion methods used by Test America.
246. Appendix F-5. In Section 7.5.1.1.2 the text discusses EPA sample data, USGS sample data, and makes reference to Hearst and Associates' split sample data from offsite wells, which is then referenced to Appendix F-5. However, most of that data is missing from Appendix F-5. Revise Appendix F-5 to include all missing data discussed in this Section (Currently includes only radium results from November 2013 sampling).
247. Appendices H-1, H-2, H-6, and H-7. Revise to include day/month/year date(s) that this data/information was collected, whenever available.
248. Appendix M, Figure M 1.4. In some cases, the Geostatistical Estimate of RIM Occurrence (purple dashed line) does not encompass clear instances of RIM. For example, on Figure M 1.4, PVC-38 shows a gamma count of 20,000 cps yet is not included in the estimate of RIM. Please clarify what is illustrated in these figures.

249. Figure N1.6. The water level elevation for D-14 is shown as “not used”, presumably because this well is damaged. However, the water level is not inconsistent with the water level shown for LCS-6B (value not shown on map but graphic symbol for water level is shown). Damaged or not, there does not seem to be sufficient evidence to dismiss this water level and none could be located in the document. Please provide the water level for D-14 or explain why it was not included.

Editorial /Typographical

250. Entire Document. Avoid qualifiers such as "generally" and discuss data as qualitatively as possible (i.e. 97% of samples are below limits, mean and median results are consistent with average background values, etc)
251. There is a lot of information in Section 2 (Summary of previous investigations) that doesn't make sense unless you are familiar with the Site background (Section 3) and physical characteristics (Section 5) of the Site. It is recommended that the content of Sections 3 and 5 be located before the Summary of Investigation Section (2), and Site Investigation Activities Section (4).
252. Page ES-1, fourth paragraph. The first statement ends with the phrase, “among others”. Delete this phrase or specify who the other parties are.
253. Page ES-1 and ES-2. Delete the adjective extensive from the Executive Summary.
254. Page ES-1 and ES-2. "OU", “MSW”, and “RIA” should be defined when it is first used.
255. Page ES-1 and 2. This part of the Executive Summary should list the section headings of the report rather than the CSM subsections. The purpose is to summarize and explain the flow of the RI report.
256. Page ES-1, fourth Paragraph and ES-2 first paragraph. The use of a 30-year timeframe on page ES-1 and a 40 year timeframe on page ES-2 is somewhat confusing. Clarify the difference in timeframes.
257. Page ES-1, first paragraph, last sentence. The submittal date of the draft RI Addendum is incorrect. (2017 instead of 2016). Revise the date.
258. Page ES-1, second Paragraph. Remove the second reference to fate and transport in this paragraph and revise the last sentence to reference the actual BLRA submitted contemporaneously with the RIA.
259. Page ES-2, third paragraph. In the first sentence, replace the word “by” with “to” so that it reads, “... exposures to radionuclides at or from the site to onsite or offsite workers...”.
260. Section 1.1 page 2, last paragraph in section, line 3. Replace the word “addresses” with “discusses”.
261. Section 1.2, page 3. Provide sufficient detail in the Appendix descriptions, either in this section or in the Table of Contents to understand the information presented in them. (e.g., Appendix D also contains the Data Usability Analysis, and Appendix O contains the Latty Avenue photo interpretation). Section 3.1, page 22, last paragraph. Revise the first sentence by deleting, “have been or could be”, and replace with the word are.

262. Section 3.3.1, page 25, last sentence in section. Insert "pursuant to orders from the state Attorney General's Office, EPA Region 7 and Missouri Department of Natural Resources" after "activities" then delete "closure and"
263. Section 3.3.2, page 25. Remove the first two sentences of this section and discuss them in Section 5. Also remove this same language from Section 3.3.2.1 and 3.3.2.2.
264. Section 3.3.3, page 27. The reference to Figure 3-6 appears to be incorrect. Figure 3-8 illustrates MDNR permitted areas.
265. Section 3.3.2.1, page 26. The text indicates the North Quarry landfill overlaps the "southeastern" portion of Area 1. It appears this should state the "southwestern" portion. This correction should also be made to Footnote 24.
266. Section 4 - Some subsections in Section 4 report general results of analyses in the text (ex. 4.5.7, 4.12.2.1) but most subsections do not; they just refer to the appendix where lab results are included. It is recommended that the presentation between subsections be consistent to the extent possible. Indicate in the sub-sections that the results are discussed in Section 7 of the report.
267. It might be helpful to the reader to combine Sections 4.4 and 4.5 so that soil borings and logs are discussed with the samples collected and analyzed from those borings.
268. Section 4.4.2, page 41, first paragraph after bullets. Revise the first sentence into several sentences. The way it currently reads suggests that soil boring advancement, down-hole radiological logging, and soil-boring abandonment are ways to complete soil borings.
269. Section 4.5.6, page 64, first paragraph. Spell out LBSR the first time it is used in the document. It is not spelled out until page 177.
270. Section 4.6, page 70, last sentence of section. Remove "and" after "identify".
271. Section 4.12.1.2, page 85. Reference Figure 4-13 in this section as it identifies where the SED-1 through SED-4 samples and the weir samples referenced in the text are located.
272. Section 4.12.1.2, page 88, center paragraph. There is reference to NCC-003 and NCC-004. Indicate with parentheses that these are now called OU1-003 and OU1-002 for consistency between text, lab reports, and Figure 4-15. Note that text states "OU-1-001", but Figure 4-15 shows as OU1-001. Correct text to ensure consistency.
273. Section 4.13.2.1, page 99, first paragraph. Revise the half-life of Rn-219 to four seconds, not four days as stated.
274. Section 6.1.1, page 154, paragraph 4. Spell out FOB first time used.
275. Section 6.7, page 175. Correct typographical errors in line 3 and line 5 ("are unknot known" and "I 2016", respectively).
276. Add RSL to the List of Acronyms.
277. Section 7.1.1.3, page 180, last paragraph, sixth line. Remove "that" after the phrase "... processing or depository site".

278. Section 7.1.2.2, page 184, paragraph 2, second line. Change "...isotopic thorium, uranium, and by gamma spectroscopy." to "...isotopic thorium and uranium by gamma spectroscopy."
279. Section 9.3.2, page 249, third paragraph. The phrase "the hydraulic gradient" located in the fifth line of the paragraph is unnecessary.
280. Section 9.3.2, pages 249-250, fourth paragraph. Be more specific when describing wells. State where the nearest public water well or intake is located with regards to the Site rather than stating there are none near.