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Overview and Summary of Primary OSRTI Comments on Supplemental Feasibility Study, Operable Unit 1 ("SFS") West Lake Landfill, Bridgeton, Missouri[1]

November 1, 2010

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Superfund

~~SIGNIFICANT SUBSTANTIVE ISSUES~~

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1. The final document should include a full and accurate characterization of the radioactive and other (e.g., RCRA hazardous waste) materials. Among other things, it should address EPA's principal threat determination guidance (OSWER Directive 9380.3-06FS). Based on information and data contained in the remedial investigation (RI) report, as well as two NRC reports (1982 and 1988 described more fully in #2 below), it would be appropriate to conclude that the radioactive materials could pose "a significant risk to human health should exposure occur" because these materials have "high concentrations of toxic compounds." For example, in light of the fact that cleanup level is 5 pCi/g, it is significant that the NRC reports state that subsurface soil contamination concentrations of Ra-226 (radium) are up to 22,000 pCi per gram (1988 report at p. 9). The remedial investigation report indicates radionuclide concentrations as high as those reported by NRC.

Consistent with the statute, NCP and program guidance, principal threat waste (PTW), whether radioactive or chemical, triggers the need to evaluate treatment options (which could be added to current Section 4). Thus, if the SFS evaluation of the occurrence of PTW in OU1 determines that PTW is in fact present, the SFS needs to explain how the remedial alternatives for OU1 at this Site satisfy the preference for treatment to significantly reduce toxicity, mobility, and volume.

2. The final document's full and accurate characterization of the radioactive materials should explicitly reconcile the data and findings of the RI with the data, primary findings, and conclusions of a radiological survey conducted by Radiation Management Corporation (RMC) for NRC in 1980-1981 (and published in 1982), and the 1988 NRC Summary Report, including:

- Radioactive contaminants are in two areas (which were subsequently designated as Radiological Disposal Areas 1 and 2). (at page 20 of RMC report)
  Almost all of the radioactivity is from uranium (U-238 and U-235) and its decay products (at page 20). Radioactivity is dominated by thorium-230 and radium-226.

- In addition, " . . . the radioactive decay of the Th-230 will increase the concentration of its decay product Ra-226 until these two radionuclides are again in equilibrium. . . .the Ra-226 activity will increase by a factor of five over the next 100 years, by a factor of

[1] OSRTI's comments are based upon information provided during two meetings with Region 7 and PRP representatives (July 15, 2010 and September 22, 2010) and a site visit (October 28, 2010), in addition to technical and policy reviews of the subject document (dated July 23, 2010) and site-specific information in the Administrative Record. The EPA Office of General Counsel and Office of Air and Radiation also contributed to these comments.

nine 200 years from now, and by a factor of thirty-five 1000 years from now. . . Therefore, the long-term Ra-226 concentration will exceed the Option 4 criteria.[2] Under these conditions, onsite disposal, if possible, will likely require moving the material to a carefully designed and constructed 'disposal cell.'" (1988 report at p. 13). And in the Summary section, the 1988 report (at p. 15) states: "A dominant factor for the future is that the average activity concentration of Th-230 is much larger than that of its decay product Ra-226, indicating a ***significant increase in the radiological hazards in the years and centuries to come."*** (emphasis added).

- Subsurface deposits extend beyond areas where surface radiation measurements exceed [NRC] action criteria.

- "In general, the subsurface contamination appears to be a continuous single layer, ranging from two to fifteen feet thick, located between the elevations of 455 feet and 480 feet and covering 16 acres total area." (at page 15 and similar language at page 21); "a fairly continuous, thin layer of contamination, as indicated by survey results" (1982 report at p. 16); "The contaminated soil forms a more or less continuous layer from 2 to 15 feet in thickness (1988 report p. 5); "the waste was covered with only about 3 feet of soil." (1988 report at p. 1).

- These data are generally "... consistent with the operating history of the site, which suggests that the contaminated materials was moved onto the Site within a few days time, and spread as cover over fill material." (at page 16 and similar language at page 20)

3. The final document should fully address the technical recommendations made by the Office of Superfund Remediation & Technology Innovation (e.g., about the cap, air and groundwater monitoring, and flood mitigation measures), which were provided in a May 2009 memorandum, but are not cited in Section 8 or mentioned in Section 5.2 of the current draft. The final document should also explain how the containment remedy that is being evaluated and compared to the two additional, excavation-based alternatives would incorporate these recommendations.

4. The final document should eliminate the ambiguity in the draft about the design, performance objectives, and expected protectiveness of the landfill cover that is envisioned in the May 2008 Record of Decision (ROD) and would be constructed under that containment remedy. A casual reader of the draft could come away with the erroneous impression that the ROD-selected remedy would not be protective, but would be constructed anyway under this containment alternative.

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[2] The 1988 NRC report describes five options under 10 CFR 20.302 for onsite disposal; options 1 – 4 are for "slightly contaminated materials" and option 5 is "onsite storage pending availability of an appropriate disposal method."

The ambiguity in the draft arises from claims in Section 5.2.1 that "the ROD-specified cover design may not be sufficiently thick to control radon emissions," while neglecting to explicitly affirm that, under this remedial alternative, the cover would be designed and constructed to meet whatever specifications are deemed necessary during final remedial design (e.g., a four-feet thick clay layer) to meet all performance standards and ensure protectiveness.

The final document should clarify that the containment remedy that is being evaluated and compared to the two additional, excavation-based alternatives is a refined version that at a minimum incorporates the technical recommendations by the Office of Superfund Remediation & Technology Innovation in May 2009 about the cap, air and groundwater monitoring, and flood mitigation measures. The final document should be unequivocal about the need to implement a protective remedy, and should acknowledge that this may require changes to the containment remedy described in the ROD depending upon decisions that Region 7 makes upon completion of its review of the final SFS.

5. The final document should also explicitly reconcile the data and findings of the RI with the data, primary findings, and conclusions about hydrology and groundwater in the two NRC reports described more fully in #2 above, including:

- "Studies indicate the landfill is on the alluvial floodplain of the Missouri River." (1982 report at p. 3). "About 75 percent of the landfill site is located on the floodplain of the Missouri River" (1988 report at p. 5) "contamination of water in the bedrock aquifer is possible" and ***"The water table of the Missouri River floodplain is generally within 10 feet of the ground surface, but at many points it is even shallower.*** At any one time, the water levels and flow directions are influenced by both the river stage and the amount of water entering the floodplain from adjacent upland areas" (emphasis added) and "This represents the likely direction of leachate migration from the landfill." (1988 report, p. 6).

- "Any possibility of disposal on site will depend on adequate isolation of the waste from the environment, especially for protection of the groundwater. It is unclear whether the area's groundwater can be protected from onsite disposal at a reasonable cost." (1988 report at p. 14).

The final report needs to address how these statements affect potential leaching within the existing landfills, as well as potential for enhancing the mobility of hazardous substances into groundwater from the landfills. Section 2 would be a logical location for this discussion and a summary of pertinent, site-specific hydrologic and hydrogeologic information.

6. Groundwater conditions ~~and the objectives of the planned, interim remedial actions for groundwater~~ should be described in greater detail in Sections 2 and 5.2, respectively.

- The final document should acknowledge that interpreting flow conditions and contaminant sources is complicated due to the hydrologic/geologic setting (e.g., perched

ground water has been observed), operation of the leachate collection system for the Former Active Sanitary Landfill, and other man-made influences (e.g., Earth City and levee maintenance).

- The description of groundwater quality conditions should identify all constituents that have been detected in groundwater at concentrations greater than their respective MCLs~~, which trigger the need for remedial action for ground water~~. In particular, the final report should address the MCL exceedences (e.g., Radium) identified in the ROD (see Table 5-1).

- The expanded discussion of the ground water monitoring plan should fully reflect the May 2009 OSRTI technical recommendations (e.g., installation of new sentinel wells, adaptive monitoring approach).

- The ground water monitoring plan should not rely on filtered samples. Among other considerations: (i) the generally accepted method is to analyze un-filtered samples; (ii) there were minimal differences between the results obtained from filtered and unfiltered samples historically, according to the ROD; and (iii) release and transport of colloids, if any, may represent a more important migration-to-groundwater mechanism for radionuclides than would dissolution/leaching.

- The objectives of the ground water monitoring plan should be clearly and definitively stated in the final document, which may lead to some differentiation in the details of the ground water monitoring plans under the excavation and containment alternatives. The elements of the respective monitoring plans should reflect the stated objectives. Although it has been suggested that the proposed ground water monitoring program for the containment remedy is intended to demonstrate that the remedy "performs as required over the post-closure period," it does not entail any leachate monitoring, even though one of the key remedial objectives is "[m]inimize infiltration and resulting contaminant leaching."

- The objectives of the ground water monitoring plan ~~as an interim remedy, and its role in the final remedy for ground water,~~ should be clearly and definitively stated in the final document. A reasonable goal for the monitoring program would be to complete the characterization of site-wide groundwater conditions. ~~sufficient to evaluate and select a final remedy for ground water.~~

- In Section 5.2.2.3, the draft SFS states "Statistical evaluation of groundwater data ~~... to ...~~would be used to assess groundwater quality and identify long-term trends." ~~should include tests to assess whether substance concentrations are decreasing and are declining at rates that would restore groundwater to its beneficial use in a reasonable timeframe and achieve ARARs throughout the plume, consistent with the NCP and Superfund guidance.~~ The final report should explain how (and specifically which) data will be collected and analyzed to document this.

7. The final report needs to identify and fully analyze available approaches, which may include movable enclosures, for reducing nuisance attraction to and congregation at the landfill by birds during potential implementation of each of the alternatives. The United States Department of Agriculture, Animal, and Plant Health Inspection Service, Wildlife Services, among other potential authorities, should be consulted to identify appropriate, cost effective means for ensuring that remedial actions undertaken at the Site would not unnecessarily jeopardize public safety with respect to the airport and its operations. At a minimum, potentially effective approaches should be identified and evaluated in the Section currently entitled 'Technology Screening,' which should provide a thorough analysis of all aspects of each approach (e.g., movable structures may allow work to proceed during inclement weather, which could shorten the duration of the remedial action and provide savings to off-set the cost of the structure).

8. The final report needs to identify available approaches, which may include movable enclosures, for preventing pollution of storm water during potential implementation of each of the alternatives. At a minimum, potentially effective approaches should be identified and evaluated in the Section currently entitled 'Technology Screening,' which should provide a thorough analysis of all aspects of each approach.

9. The descriptions of the three remedial alternatives, which appear in Section 5 of the current draft, should identify the expected useful lifetime (or expected "design life") for each distinct cover. This is especially important because of potential radiological hazards described in the 1988 NRC report, which indicates "a significant increase in the radiological hazards in the years and centuries to come," as documented further in #2 above.

The evaluations (e.g., relating to Long Term Effectiveness and Permanence and Compliance with ARARs), which appear in Sections 6 and 7, should objectively consider and compare the design life relative to the duration over which significant radioactivity is expected to be present under each respective alternative. Among other considerations, the final document needs to address the OSRTI recommendation in May 2009 that the proposed cover meet UMTRCA guidance for a 1,000-year design period. It also needs to address the fact that the typical design life of a RCRA subtitle C or subtitle D cover is substantially shorter than the long-term duration of radiological hazards described by the NRC. The final document needs to explain the reliable financial mechanism for ensuring proper, periodic ~~replacement~~ repairs and how O&M over a period of hundreds of years will be assured.

10. The final document should provide a full, accurate and up-to-date accounting of evidence, if any, that significant quantities of potentially hazardous wastes and asbestos-containing materials are present in Areas 1 and 2 and should include a coherent, internally consistent evaluation of related (e.g., hazardous waste and mixed waste) issues. In particular, the final document needs to fully characterize and identify RCRA hazardous wastes (e.g., metals; solvents) and discuss the RCRA subtitle C regulations as a potential ARAR for proper disposal of such hazardous wastes. The presence of hazardous waste may pose significant implementation problems, could impose significant costs regarding the excavation alternatives, and would prompt the need for changes in

the identification and evaluation of related ~~ARARS~~ ARARs (in Section 3)~~; it would also contradict the premise for using a Sub-title D cover as a foundation (starting point) for a final cover for Areas 1 and 2 under the containment alternative.~~ .

~~**SCOPE AND ORGANIZATION**~~

11. The opening sentence of the Introduction (Section 1) should clarify the purpose of the document, which is reflected by the following sentences: "As a result of its internal deliberations and its further consideration of certain comments provided by interested community members, EPA determined that a Supplemental Feasibility Study (SFS) is warranted. This SFS will be added to the Administrative Record for this Site."

12. Section 1.1 might be more appropriately entitled "Scope" if the relevant discussions about scope are consolidated therein. On that basis, the first sentence of Section 1 should be moved to become the opening sentence in Section 1.1 and the first two complete paragraphs on page 3 (about NCP requirements) should be moved to Section 1.1. In addition, Section 1.1 should note the following: "Among other things, this document refines the description and evaluation of the containment remedy that was selected in the ROD. It also addresses in detail various facts and findings contained in two NRC reports that evaluate this Site."

13. If the changes recommended in comment #12 above are made, then Section 1.2 might be more appropriately entitled "Approach." On that basis, the second sentence of Section 1 should be moved to become part of the opening of Section 1.2.

14. It is logically awkward to partially discuss cleanup levels (Section 2.2) in advance of a discussion of ARARs (Section 3.1, which includes additional discussion about cleanup levels), and within a section that otherwise is devoted to site-specific information about land use, operations, and hydrology. A more satisfactory alternative organization would entail a separate discussion of RIM presence, distribution and extent (say new Section 4) that follows the discussion of ARARs (Section 3.1) and precedes the 'Technology Screening' (currently Section 4). If a new Section 4 is created for these purposes, then Section 2 could still retain a general discussion of the nature of the RIM (e.g., origins, amounts disposed over what time period, primary radiological parents, expected longevity and in-growth of the radioactivity), but would not introduce the volume estimates nor discuss the distribution of RIM within the landfill.

15. We recommend a separate section devoted to the characterization of radiologically impacted materials (RIM) to consolidate the relevant discussions and conclusions that are dispersed in the current draft (e.g., the discussion of uncertainty in the volume estimates is in Section 5.3.1 in the current draft) and provide a full, accurate and up-to-date characterization of the RIM, one that (among other things) is consistent with the statute, NCP and EPA guidance (e.g., principal threat waste guidance), and consistent with comments provided on the March 22 draft work plan (see comment #2 above). It also will provide for a transparent discussion about whether the RI data are consistent with or different than the NRC data and/or can be reconciled with various

statements and conclusions in those reports (for example, that radioactive soil was disposed during a limited portion at the end of the operating history of the two radiological areas), including all those described in comments 1, 2 and 9 above).

16. To help make this document more self-sufficient, the scope of the remedial investigations of RIM presence should be summarized and consolidated in the final document (e.g., should incorporate information about boring density that is provided in Section 5.3.1 (page 58) of the current draft). Such a summary would provide an opportunity to explain the extent to which the NRC data were considered and evaluated in designing the RI. In light of not finding discrete layers of radioactive soil during the boring investigation and attributing radioactivity at unexpected depth in certain locations to artifacts of the boring investigation, the summary should also address and discuss whether the methods used during the RI to evaluate RIM presence were appropriate and sufficient for purposes of definitively determining the distribution of radioactivity within the landfill. This content could be incorporated into a new Section 4, dedicated to a discussion of RIM occurrences and spatial extent, as recommended above.

17. To help make this document more self-sufficient and "reader-friendly," Section 2 (suggested title: Summary of Key Site Conditions) should include concise, coherent presentations of the full range of site-specific information that potentially bears upon an evaluation of the ~~additional~~ alternatives. On that basis, the document at a minimum should include in Section 2:

- a readily identifiable sub-section that consolidates the dispersed information about surrounding land use (i.e., background information reported in Sections 2.1, 3.1.2.2.1, 5.3.4.1, and elsewhere in the draft). Such a dedicated sub-section would provide a good opportunity to identify and illustrate the proximity of the airport and orientation of its runways and the proximity of residential neighborhoods.

- additional information and potentially also clarifications about the nature and location of current on-site operations (e.g., explain why a solid waste transfer station and borrow area are essential to current site operations if wastes are no longer disposed on site; modification of Figure 2 to clarify Site boundaries and identify undeveloped area(s) of the Site). Such information would provide a foundation for the subsequent discussion of possible candidate locations for a newly constructed on-site disposal unit, as envisioned in one of the excavation alternatives.

- existing land use and ground water use restrictions for the Site, including the Negative Easement and Declaration of Restrictive Covenants Agreement mentioned on page 24 of the draft.

- a summary of the design and construction of the two non-active landfills, known as Radiological Areas 1 and 2, and evidence, if any, about the generation of methane within or underneath these landfills.

- a summary of pertinent, site-specific information about ground water (see, for example, comments #5 and #6 above).

- available information about seismic areas, Holocene faults, unstable areas, and wetlands (as cited in state landfill siting regulations [10 CSR 80-3.010(4)(b)]), which pertain to each of the remedial alternatives being evaluated.

Additional information about transportation routes (e.g., truck routes into and out of the site, location of nearest railroad line) and truck traffic (e.g., number of trips into and out of site under current operations, if available) might also warrant inclusion in Section 2 to provide a basis/context for subsequent discussions and evaluations about community impacts of the ~~additional~~ excavation alternatives (i.e., "short-term" effectiveness) and infrastructure needs of the ~~additional~~ excavation alternatives.

18. The draft SFS proposes (in Section 3.3.2) to add a new Remedial Action Objective (RAO), which conceptually may be an appropriate approach to take. The proposed fifth RAO should not be included as written, however, because RAOs generally should not prescribe specific remedial actions (e.g., waste removal) and should apply to all remedial alternatives that are being considered and evaluated. In addition, the nature, complexity, and requisite duration of the institutional controls generally are appropriate matters to consider when evaluating the long-term effectiveness and reliability of the remedial alternatives (e.g., as part of the nine criteria analysis), not as specific language in an RAO.

19. The final SFS should include an appropriately worded RAO to justify choosing groundwater monitoring as a component of the three remedial alternatives. By itself, groundwater monitoring does not attain any of the RAOs stated in the May 2008 ROD (i.e., it does not prevent direct contact with landfill contents or radiation, does not minimize infiltration or leachate generation, and does not control surface water runoff or radon and landfill gas emissions.)

20. Because the Negative Easement arose from an agreement between the Bridgeton Sanitary Landfill and the airport owner (see page 24), which did not involve MDNR, it should be discussed in a separate section, rather than within a section pertaining to MDNR solid waste regulations. We recommend including it in the proposed discussion of existing institutional controls in Section 2 (see comment #17 above for further explanation). This discussion should also summarize the outcome of recent discussions with appropriate airport authorities about the easement in the context of alternatives being evaluated in the SFS.

21. The Negative Easement is documented in the SFS (Appendix B), presumably because it potentially bears upon the implementation of the alternatives being evaluated in the SFS. The existing on-Site land use restrictions should also be documented in an appendix to the final SFS, because the information bears upon evaluations of the long-term effectiveness, reliability, and protectiveness of the alternatives being evaluated in the SFS.

22. ~~Given the expected finding and reporting in the final document~~If the SFS evaluation of the occurrence of PTW in OU1 determines that principal threat wastes are present in Areas 1 and 2 (see comment #1 above), the section on Technology Screening (Section 4 in the current draft) should identify, provide information about, and evaluate treatment options, as required by the NCP. The final SFS should provide a full, accurate, up-to-date, objective, balanced, thoughtful, and internally consistent analysis of treatment options. The draft report does not indicate whether any stabilization technologies were considered, which need to be discussed and evaluated in the final report.

The draft report does not provide an objective analysis in its limited consideration of treatment. For example, page 94 (first paragraph) states that treatment will not be used due to large volumes of material with low activity levels, and that radionuclides cannot be destroyed. ~~We believe it is inaccurate to characterize radium levels of hundred, thousands and tens of thousands of pCi/g to be "low" activity. Such levels should be considered "high" radioactivity since 12 pCi/g in soil corresponds to a 10^{-3} cancer risk level for residential exposures, which is well above the range of acceptable risks.~~ The term "low activity levels" should be replaced throughout the SFS with the actual range of activities observed at OU1.

23. The Feasibility Study is generally viewed as occurring in three phases: the assembly/development of alternatives, the screening of the alternatives, and the detailed analysis of alternatives. (In actual practice, the development and screening of alternatives are often discussed together to better reflect the interrelatedness of these efforts and because the point at which the first phase ends and the second begins is not so distinct.) Consistent with guidance for conducting feasibility studies under CERCLA (EPA/540/G-89/004; OSWER Directive 9355.3-01), the final document should contain a distinct and recognizable section that assembles/develops and presents the final set of alternatives, incorporates the results of the evaluation of treatment options (see comment #22 above), and integrates information present in Sections 3.3 (Remedial Action Objectives), 4, and 5.1 of the current draft.

24. The guidance for conducting feasibility studies under CERCLA (EPA/540/G-89/004; OSWER Directive 9355.3-01) calls for a detailed evaluation of alternatives against the NCP's nine criteria evaluation that is to occur in two sequential and separate steps: (1) an assessment of each individual alternative against the evaluation criteria; and (2) a comparative analysis among the alternatives to assess the relative performance of each alternative with respect to each evaluation criterion. The first step is intended to consider only remedial components within each individual alternative; comparisons should not be made to the other alternatives nor to response options that were not included in any of the final set of alternatives. The final SFS should conform to this guidance. The draft document does not. Section 6.2 appears to be intended to provide the Individual Analysis of Alternatives; if so, it should be so labeled. On that basis, Section 6.2.2.4, which pertains to the individual analysis of "full" excavation-and-off-site-disposal alternative, should not and need not advance arguments that compare the alternatives (e.g., "none of the alternatives [emphasis added] will reduce the toxicity, mobility, or volume of the waste material through treatment technology" at page 103); appropriate arguments comparing alternatives to the NCP nine criteria belong instead in the Section entitled

Comparative Analysis of Alternatives (Section 7 in the current draft). Likewise, the individual analysis should not make statements or arguments about other response actions (e.g., about *in situ* or *ex situ* treatment -see page 103); appropriate arguments comparing candidate response options belong instead in the Section on Development and Screening of Alternatives (Section 4 in the current draft, which is entitled Technology Screening).

25. Section 5.1 of the current draft re-caps the remedial alternatives that were considered in the Feasibility Study for Radiological Areas 1 and 2, which include a 'partial excavation' alternative (L6). This re-cap should be amended to:

- Re-state that alternative F1 (No-action Alternative) for Radiological Areas 1 and 2 does not meet the threshold criteria set forth in the NCP;
- Summarize the major conclusions set forth in the Feasibility Study about the 'partial excavation' alternative (L6) and state opinions about:
  - whether (and how, if at all) these conclusions warrant modification in light of the updated analysis and characterization of the radiologically impacted materials (RIM) - for example as set forth in Appendix A of the SFS and in proposed new Section 4 of the SFS; and
  - whether these conclusions would also essentially apply to a 'partial excavation' alternative that entailed removing RIM from the top six feet of the two areas, in which RIM was generally found, according to the April 2000 RI report (e.g., at page 92 and at page 97).

Additional analysis of the 'partial excavation' alternative(s) may also be warranted in the final SFS to the extent that any major conclusions set forth in the FS require substantive refinement, as a result of the updated analysis and characterization of RIM.

~~**CLARIFICATIONS AND CAUTIONS**~~

26. Although the initial Statement of Work is also part of the Administrative Record, this document should refer to the final Work Plan as a primary source of information about the scope and technical approach of the SFS.

27. Because the Statement of Work was primarily conceptual and does not displace or change any statutes, regulations or guidance, it does not represent a comprehensive, final statement about the scope or approach of the SFS or the scope of EPA's considerations in making remedy selection decisions. The final SFS should not include any statements that compare and contrast the Statement of Work and the final Work Plan, nor should it include any statements that could be construed as criticizing or identifying a shortcoming in the Statement of Work. (For example, the second complete paragraph on page 3 opens with "Although not required by the SOW (EPA, 2010), the NCP requires …" The phrase "Although not required by the SOW (EPA, 2010)" is unnecessary and could be misleading.)

28. The final SFS should specify which "supplemental evaluations" by TetraTech EMI (TtEMI) were relied upon by Engineering Management Support, Inc. (EMSI) (see page 2 of the current draft SFS, Section 1.2). The final document needs to clarify whether EMSI relied only upon TtEMI's initial list of potentially relevant disposal facilities and which unit costs for off-site disposal were used.

29. As stated in the 1988 NRC report (*Radioactive Materials in the West Lake Landfill*, NUREG Publication 1308, page 1), the NRC during a site inspection in 1974 determined that approximately "43,000 tons of waste and soil", comprised of leached barium sulfate residues mixed with top soil had been disposed in 1973 at the West Lake Landfill and "covered with only about 3 feet of soil.." This same NRC report notes that this landfill "was closed in 1974 by the Missouri Department of Natural Resources (MDNR)." This contemporary reference (and/or other contemporary references), rather than the 2009 report by TtTEMI, need to be cited as the basis for information summarized in the SFS about the operating history of the non-active landfills known as Radiological Areas 1 and 2~~, unless there is new information that conclusively establishes that the NRC report was incorrect~~.

30. The draft SFS needs to accurately describe the extent and timeframe for solid waste disposal activities (including non-radioactive solid wastes) in the non-active landfills known as Radiological Areas 1 and 2; as written, the draft SFS suggests they were limited to the early 1970s. The sub-section about operational history needs to clarify: 1) the overall operating period; and, 2) the design and construction of these two non-active landfills and whether they satisfy the current, primary design criteria for a RCRA Subtitle C or D landfill.

31. The final SFS needs to explain and justify why the UMTRCA standards would not be relevant and appropriate for the Radiological Areas 1 and 2, which has radioactive materials near the surface in certain locations; we note that those standards are deemed (see page 18) relevant and appropriate for the Crossroad property, which is also located on the Site.

32. The main text of the document should:

- summarize the volume estimates, including a definition of the volume being estimated (i.e., estimated lateral and vertical extent of RIM occurrences),
- clearly describe the need/purpose of those estimates (e.g., is the goal to obtain an upper-bound or a lower-bound estimate of the volume?), and
- discuss the primary sources of uncertainty in the volume estimates, which is in Section 5.3.1 of the current draft.

This content could be incorporated into a new Section 4, dedicated to a discussion of RIM occurrences and spatial extent, as recommended above. Here and throughout the text, the volumes should be described accurately and referenced consistently. ~~So, for example, the final document should use a term other than "volume of RIM" to refer to the volume of landfilled material in which the significant levels of radioactivity are found, because the lateral and vertical extent of RIM occurrences is not the same thing as volume of RIM.~~

33. The final document needs to clarify the purpose of Section 4.2 (in the current draft) and how it relates to existing language in the FS. ~~Since t~~The original FS evaluates "selective excavation of radiologically impacted materials containing higher levels of radionuclides as a potential remedial technology" and a "partial excavation" alternative with off-site disposal (L6), short-term monitoring, physical treatment, transportation, and off-site disposal ~~were~~was, in fact, considered in the original FS. In the current draft, however, Section 4.2 suggests that short-term monitoring, physical treatment, transportation, and off-site disposal, as identified and described on pages 39 to 44, are "additional" response actions that were not considered in the FS and only now warrant consideration. If there is any significant new information about short-term monitoring, physical treatment, transportation, or off-site disposal that would alter the findings of the previous evaluation, the final SFS should clearly identify and explain it.

34. The discussion about means, methods, implementability, and other aspects of transportation, and off-site disposal should reflect a consideration of the experiences during the remedial actions at the St. Louis Airport properties (SLAP) nearby.

35. Additional explanation or clarification may be warranted to provide assurance that shredding is a suitable pre-treatment step to facilitate size separation of waste materials. ~~One curious aspect about t~~The current draft~~: i~~t states that "shredders would be employed as a pretreatment step prior to a solids separation process" (See Section 4.1.2, page 41)~~, which seems questionable on its face~~. Because such a pre-treatment would tend to reduce the size of municipal solid waste materials, it could be counter-productive as a treatment step in advance of solids separation processes that primarily rely upon differences between small soil particles and larger pieces of solid waste, such as are cited in Section 4.3.3 (see pages 41-42).

36. Although the ROD does not explicitly mention (in the Description of Selected Remedy; at page 43) that substantial volume of waste materials will be excavated, handled, or moved to create stable side slopes under the containment remedy, the final SFS should explicitly acknowledge same and accurately state relevant facts (e.g., estimated waste volume to be moved), as a part of the definitive description of this alternative (which is in Section 5.2 of the current draft).

37. The final document should reach a conclusion about whether a new engineered disposal cell is feasible on the Site. The discussion of an on-site cell (Section 5.3.4.1) should include a summary or refer to documentation of recent discussions with the airport authority about waiving the Negative Easement, which the current draft implies is possible (see second bullet on page 65).

38. The final document needs to provide "fair and balanced" evaluations of the remedial alternatives. For example, as currently written, the evaluation of environmental impacts in the draft report is not fair and balanced. The draft appropriately states for both the excavation remedy (Section 6.2.2.5.3) and the containment remedy (Section 6.2.1.5.3) that "disturbance of the landfill surface would destroy those portions of the habitats that currently exist on the surface of Area 2, forcing wildlife to migrate to other areas." But only in the case of the containment

remedy (see Section 6.2.1.5.3) does the draft SFS state that "this disruption would be temporary" and "[n]o measurable long-term impacts to plants and animals in surrounding ecosystems are expected."

39. The final SFS needs to contain specific factual statements that are supported by data, rather than general characterizations. So, for example, the final report needs to report the activity concentrations of uranium and thorium in barium-sulfate residues (see page 7, Section 2.2.1), rather than to claim without further documentation that barium-sulfate residues contained only "traces" of uranium and thorium. Likewise, statements that the radioactivity levels in the waste materials are "low" (See page 94), if true, needs to be backed up with specific, credible sampling data compared to specific benchmarks of safety. Similarly, given the specific language in the NRC reports to the contrary, the final report needs to provide a readily recognizable, verifiable, scientific basis for the characterizations (see page 8) that "radionuclides are present in a dispersed manner throughout the landfill deposits" and "the soil containing radionuclides is intermixed and interspersed within the overall matrix of landfill refuse, demolition and construction debris, fill materials, and unimpacted soil" or for the claim (see page 92) that "Long-term site management plans and institutional controls would be robust and durable." [underlining added for emphasis]. Among other considerations, the statement that "radionuclides are present in a dispersed manner throughout the landfill deposits" appears to be ~~misleading and~~ inconsistent with certain conclusions reached in the NRC reports (e.g., see quotes above in #2) and the RI report, which suggest a more limited, but well-defined vertical distribution (e.g., "In the northwestern part of Area 1, radiologically impacted materials were identified at depths generally ranging between 0 and approximately 6 feet" (at page 92 of the April 2000 RI report); Radiologically impacted materials were generally found at depths ranging between 0 to approximately six feet in the northern and southern parts of Area 2 (at page 97 of the RI report)).

40. The final report should minimize unnecessary, duplicative information. For example, the history of this document's development (i.e., letters and workplans) is repeated throughout the draft (see, for example, introduction to Sections 2.3 and 4.2, in addition to opening paragraph of Section 1), as are statements that the "complete rad removal" alternative wouldn't really remove the radioactive materials completely (see, for example, page 1, second paragraph of Section 2.2.2, and fourth paragraph of Section 3.1.1.1.1) and that EPA required two additional alternatives to be evaluated (see, for example, last sentence in Section 1.1 and introduction to Section 4.2, in addition to third paragraph of Section 1.1). As a general matter of style and readability, non-critical information of this kind need not be restated repeatedly throughout a document.

41. As a result of addressing the fore-going comments, related portions of the document (e.g., analysis of alternatives per the nine NCP criteria) may also warrant amending.

~~**ADDITIONAL EDITORIAL SUGGESTIONS AND TYPOGRAPHIC ERRORS**~~

42. ~~p~~Page 9: The r~~, r~~isk-based cleanup level for uranium should not be above background. This is inconsistent with EPA's Role of Background policy. The risk based cleanup level should be expressed as a single concentration which includes background.

43. ~~p~~Page 9:~~,~~ ~~t~~To comply with EPA policy, cleanup levels for uranium should be expressed both in terms of mass for total uranium non cancer risk, and activity per uranium isotopes for cancer risk. The non-cancer risk-based level of total uranium should be stated, along with a concise comparison to the cancer-based level and a declaration of which is lower and governs the cleanup.

44. P~~p~~age 28, third paragraph~~,~~: See Comment 22 above. ~~t~~The basis of calling radioactive contamination "low activity" is not apparent, particularly since most of the owners and operators of licensed disposal facilities consider it too radioactive to accept. The radium-226 concentrations at UMTRCA sites generally are not above 1,000 pCi/g, but West Lake has multiple hits over 10,000 pCi/g ~~and one reportedly over 4 billion~~. For these and other reasons set forth herein, the term "low activity" should not be used to characterize the radioactive waste in the landfill.

45. P~~p~~age 57, third paragraph: ~~s~~This section states that the design-phase survey will be conducted using 40 CFR 192 and MARSSIM. Since the approach in 40 CFR 192 uses an average, while MARSSIM uses statistical tests, the current draft is ambiguous about how would this be accomplished?~~.~~ When discussing the 5-pCi/g standard in the document to define the RIM, the final report needs to clearly indicate which approach is being used: 40 CFR 192 area averaging, MARSSIM statistical test, or a not-to-exceed approach.~~?~~ See also page 60, third paragraph, first bullet. The final document should be clear about whether a statistical test, MARSSIM (40 CFR 192), a not-to-exceed approach, or another approach will be used.

46. P~~p~~age 105, second and third paragraphs:~~.~~ See Comment 22 above. The waste should not be characterized as "low activity." Among other considerations, characterizing the waste as "low activity" is undermined where the draft report states that a remediation worker will get 499 mrem/yr exposure for off-site disposal option, and that OSHA equipment and practices may not provide adequate protection for workers. For these and other reasons set forth herein, the term "low activity" should not be used to characterize the radioactive waste in the landfill.

47. ~~p~~Page 108, third paragraph:~~.~~ Blending to change waste characteristics for disposal is generally inconsistent with EPA practices. Was consideration given to sending most waste to U.S. Ecology, with higher containers going to another facility (e.g., Energy Solutions)?

48. ~~p~~Page 114, last paragraph:~~.~~ The draft report does not describe what consideration was given to separating the trash from the radioactive material to have less volume of waste to dispose. The final report needs to fully and accurately address this issue. The final document should consider various techniques to reduce waste volume.

49. Table 5, PVC-21, depth 18 feet:. ~~Is the sample of 4.4 billion pCi/g of radium accurate or a misprint? If this is a misprint, please correct. If it is correct, explain how such an extremely high level would be dealt with during any remedial response and how it may have come to be deposited in the landfill.~~The result of 4.4 billion pCi/g for this sample appears to be in error and must be corrected.

50. Appendix F, page 6, footnote a: ~~,~~ This footnote states that Region 9 soil screening levels were used for chemical risk assessment. The final report should use Regions 3, 6, 9, regional screening level calculator in order to provide a more accurate, up-to-date evaluation.

51. Appendix F, page 11, last paragraph: ~~,~~ ~~t~~The report needs to either~~:~~ provide the rationale for using RESRAD, rather than the PRG calculator, in that situation~~;~~ or re-run the assessment using the PRG calculator.

52. Appendix F, page 54, first paragraph, and table 8-4, second column:. The PRG calculator does include external as well as inhalation for the ambient air scenario, as does the indoor scenario in the BPRG calculator. The risk assessment should be corrected to include this pathway of exposure.

53. Appendix F, page 71, table 10-3, column 5:. The source of these concentrations should be explained in the final document. These concentrations appear~~s~~ to be much lower than the survey results.