STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
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NOV 2 4 2014

Ms. Lynn Slugantz
Office of Regional Administrator
U.S. EPA Region 7
11201 Renner Blvd.
Lenexa, KS 66219

RE: Comments on Isolation Barrier Alternatives Analysis, West Lake Landfill Superfund Site, dated October 10, 2014

Dear Ms. Slugantz:

This comment letter is in response to the submittal prepared by Engineering Management Support Inc. (EMSI), Feezor Engineering, Inc., P.J. Carey & Associates, P.C., and Auxier & Associates, Inc. entitled "Isolation Barrier Alternatives Analysis, West Lake Landfill Superfund Site", which was transmitted to Lambert-St. Louis International Airport by letter dated October 15, 2014. The analysis was requested by the U.S. Environmental Protection Agency (EPA) by letter dated August 26, 2014.

This comment letter was developed by the Department of Natural Resources, Hazardous Waste Program and the Department's Solid Waste Management Program staff in coordination with the Missouri Department of Health and Senior Services (MDHSS) and consultation with Mr. Todd Thalhamer, P.E. The MDHSS comments are provided as an enclosure to this letter. Please consider these comments as your agency, the United States Army Corp of Engineers (USACE), and Lambert Airport evaluate the options presented in the Isolation Barrier Alternatives Analysis report.

Hazardous Waste Program Comments:

Bird Mitigation Plans

The third sentence of the first paragraph of Section 1.0, Introduction, states, "In the August 26, 2014 letter transmitting the USACE report (EPA, 2014a), the United States Environmental Protection Agency (EPA) requested the Respondents to use the USACE report "…as a basis to further develop more detailed plans for the Isolation Barrier, specifically including bird mitigation plans, for each of the proposed alignment alternatives." The document goes on to state that a meeting was held on September 18, 2014 between EPA and the Responsible Parties. The EPA memorialized the meeting and refined the scope of work to be performed by an email dated September 23, 2014. This email again requested bird mitigation

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plans for select alternatives, as well as including additional evaluations for "No Action" and "Proposed Cooling Wall" alternatives.

Based on the initial scope of the request and further direction from EPA, bird mitigation plans should have been included in the analysis for Options 1, 3 and 4. The discussions within the analysis evaluate the potential for each alternative to attract birds, but not how to mitigate this potential. Furthermore, Attachment D, Isolation Barrier Alternatives Analysis – Bird Control Issues, appears to also focus more on bird attraction potential and the need for a bird control program with little details on the design and implementation of such a program. However, it is noted that Attachment D, Section 5.0, states in reference to Options 1 and 3 that, "The two options have the same bird hazard risk which can be well-controlled in either case." We strongly recommend EPA require the Respondents to prepare detailed bird mitigation plans for the alternatives, as initially directed by your agency.

Reference to the Draft Subsurface Smoldering Event (SSE) Impact Evaluation

The analysis references the document titled *Evaluation of Possible Impacts of a Potential Subsurface Smoldering Event on the Record of Decision – Selected Remedy for Operable Unit-1 at the West Lake Landfill* (SSE Impact Evaluation) and states that revisions to the report and responses to comments are currently in progress. Revisions to the "SSE Impact Evaluation" may affect the conclusions of this document. We suggest EPA require the Respondents to address comments provided by Mr. Todd Thalhamer, P.E. and the MDHSS and finalize the "SSE Impact Evaluation" document before using it as a reference for this analysis.

In addition, "Section 3.6.2 Potential Impacts if a SSE were to Occur in Area 1", the third sentence of the second paragraph states, "The EPA-ORD comments indicated that EPA generally concurred with the three points listed above; however, EPA-ORD did offer additional points in particular highlighting its opinion that if a SSE were to occur in OU-1 it could create the potential for additional leachate generation." EPA-Office of Research and Development (ORD) also commented on the potential for release of fine particulates. EPA-ORD comment on Bullet Point #2 states, "Surface cracks and fissures may allow gases (such as radon and steam) to escape, and potentially create conditions that could allow fine particulates to escape from the landfill." We suggest EPA require the Respondents to include this potential exposure pathway in the analysis.

"No Action" Protective of Human Health

Section 3.7 of the document and Table 1 identifies the "No Action Alternative" as being protective of human health and the environment. This is inconsistent with the summary of risks as presented in the Supplemental Feasibility Study (see Section 2.5.1). Such a conclusion also contradicts the necessity of a remedy for Operable Unit 1, Area 1.

Additionally, the document does not quantitatively assess the risks associated with other potential pathways identified by EPA-ORD, MDHSS, and Mr. Todd Thalhamer, P.E. Therefore, the conclusion that "No Action" is protective of Human Health is not supported by the record (see Department letter dated April 24, 2014, Enclosure: Memorandum from Mr. Todd Thalhamer, P.E., dated April 14, 2014).

In "Section 3.6.2, Potential Impacts" if a SSE were to Occur in Area 1, the first sentence of the third paragraph states, "Because the RIM would remain buried beneath other waste materials and soil or inert fill, no changes in other exposure pathways (direct contact with or dermal exposure to the RIM or exposure to gamma radiation) are expected to occur if a SSE were to migrate into Area 1." This statement appears inconsistent with current site conditions. The Remedial Investigation and other documents/site observation conclude that radiologically-impacted materials (RIM) occur at or very near the highly vegetated surface and are not buried by other waste material, soil, or inert fill. We suggest EPA require the Respondents to revise this document and the "SSE Impact Evaluation" document, to include analysis of risk associated with conditions that could be created by an SSE or a surface fire.

RIM Relocation on Area 1

The discussions for Options 1 and 3 (Sections 4.7 and 6.7) describe relocation of RIM onto Area 1. This contradicts the USACE document which states that RIM waste excavated as part of wall installation will require off-site disposal. We suggest EPA require the Respondents to revise the document to be consistent with USACE recommendations.

Need for Further Characterization of RIM

In "Section 2.1, Isolation Barrier Alternatives", the first sentence of the last paragraph states, "The USACE report also considered an additional alignment (Alignment 2) that would consist of installation of an inert barrier located south of OU-1 Area 1 to ensure that all RIM is located to the north of the Isolation Barrier." Full characterization of RIM is necessary to support this consideration. The Department notes that the USACE document states in Section 1, Key Point #1 as follows:

"The full extent of the RIM has not been determined, specifically in the southwest portion of OU1 Area 1, east of and around the existing Transfer Station. Before design work can be completed for the IB, additional subsurface investigative work is necessary to determine the limits of the RIM as well as to collect geotechnical data necessary for the design of the IB."

The Department supports USACE's conclusion with respect to the design of the Isolation Barrier. Given slowly increasing temperatures in the neck, we further suggest EPA require the Respondents to immediately characterize RIM in the entire North Quarry. The Department's SWMP is currently requiring the installation of needed additional temperature monitoring probes

in the neck area and this may provide an opportunity for the Respondents to do simultaneous RIM characterization.

Solid Waste Management Program:

Missouri is a U.S. EPA approved state for implementation of Subtitle D of the Resource Conservation and Recovery Act (RCRA). Under 42 U.S.C. 6901-6991K and 40 CFR Parts 257 and 258 requirements, Missouri has authority to permit the design and operation of municipal solid waste disposal areas. All aspects of the design, operation, closure and post closure of these facilities fall under the authority of the Solid Waste Management Plan.

Solid Waste Management Program General Comments:

We were unable to ascertain that the alternatives considered comply with all Applicable or Relevant and Appropriate Requirements (ARARs). Specifically, under a CERCLA Removal Action, any staging, management and relocation of excavated wastes on the West Lake Landfill Superfund site must comply with all ARARs including Missouri Solid Waste Management regulations and siting requirements.

The lack of definition for the twelve assessment factors make it difficult to determine whether issues in managing excavation and movement of decomposing municipal solid waste were adequately considered in the Isolation Barrier Alternatives Analysis process. Associated factors which should be taken into consideration as part of this evaluation are discussed throughout the following comments.

Solid Waste Management Program Section Specific Comments:

1.0 Introduction

The objective of the analysis does not consider the characteristics of the previous surface and subsurface fires that occurred in the North Quarry with temperatures that reached 800° F. Considering only temperatures in a range similar to those found in the South Quarry subsurface smoldering fire, of approximately 300° F, is not sufficient for analysis of isolation barrier alternatives. (See "Task 4 Assessment of Results/Recommendations for Future Action Subsurface Combustion at Laidlaw Bridgeton Landfill" submitted by SCS Engineers for Laidlaw Bridgeton Landfill. The assessment report is available on the Department's website at http://dnr.mo.gov/env/swmp/facilities/docs/alldocs 19921994.pdf , pgs. 119-126 of the report.)

Furthermore, due to incomplete characterization of radiologically-impacted material in the North Quarry, there is heightened concern with allowing any combustion to occur in that area. To address this concern, the SWMP on October 7, 2014 issued a letter to Bridgeton Landfill, LLC

requiring submission of a corrective action assessment and plan that identified a corrective action zone encompassing the northern neck and the southern portion of the North Quarry. Bridgeton Sanitary Landfill must be positioned to immediately implement additional measures to contain the existing subsurface fire to the South Quarry area and to extinguish any independent fire or reaction that might occur in the North Quarry.

In summary, consideration needs to be given to:

- The potential for waste materials in the North Quarry to combust at a significantly higher temperature than waste materials found in the South Quarry.
- Adequately characterizing waste materials and determining the extent of the radiologically- impacted material that might be affected by a smoldering fire originating in the North Quarry or moving into the North Quarry from the South Quarry.
- If combustion were to occur in the North Quarry, an understanding of the types of emissions that would be expected from the waste materials is needed, including any radiologically-impacted material.
- Potential impacts of an additional smoldering fire on the grout or slurry used to extinguish the 1992-1994 subsurface/surface fire through oxygen deprivation. It is unknown how the injected material will behave as it dries and potentially crumbles allowing oxygen to infiltrate the waste mass, i.e. oxygenating the subsurface fire.

3.0 No Action Alternative

As noted above in Section 1.0, it is imperative that Bridgeton Sanitary Landfill have readily implementable methods for addressing any northward progression of the subsurface fire into the North Quarry. The SWMP's October 7, 2014 letter to Bridgeton Landfill, LLC required submission of a corrective action assessment and a corrective action plan. The identified corrective action zone encompasses the northern neck and the southern portion of the North Quarry. Bridgeton Landfill has submitted a corrective action plan and the SWMP is currently reviewing that material for response.

The No Action Alternative does not appear to fully consider the following:

- The slowly upward trending temperature data reported by Bridgeton Sanitary Landfill in the Neck Area temperature monitoring probes is an indicator that the waste mass is slowly heating and drying out, which creates an unacceptable risk of combustion if there is movement of the South Quarry subsurface fire or development of a separate event in the neck.
- The presence of some radiologically-impacted material in the North Quarry (full extent unknown at this time) and the potential for that material to be affected by an independent smoldering fire occurring in the North Quarry given the existence of such an event currently in the South Quarry and previously in the North Quarry.

- This option appears to place considerable weight on the unproven Heat Extraction Pilot Study. While the SWMP saw no technical reason for denial of the pilot study, we have yet to be provided any data to support that this ambient air cooler system, on its own, removes sufficient heat to halt progression of a smoldering fire.
- No time frames were given for the provision of the heat transfer modeling and additional demonstrations and evaluations of factors controlling migration of the subsurface fire into the North Quarry; therefore it is unclear whether this information will be timely provided for use during the decision-making process for the isolation barrier.
- The Department's contracted landfill fire expert, Mr. Todd Thalhamer, P.E. provided in a February 13, 2014 comment letter a discussion of risks associated with the subsurface fire coming into contact with radiologically-impacted material in the North Quarry. Such risks included the potential for smoke and dust generation from the interaction of the subsurface fire and waste material. Was consideration given to Mr. Thalhamer's comments?
- In a recent report, the USACE states that due to design considerations, construction of an isolation barrier is at least 18 months from beginning. While that schedule is detailed step-by-step, the unique urban setting of the West Lake Complex where thousands of people live and work must be considered in evaluating isolation barrier alternatives and all efforts for expedited timeliness in implementation should be applied.

4.0 Option 1 – Inert Barrier Along Alignment 1 and
6.0 Option 3 – Inert Barrier Along Alignment 3

Consideration in regard to the inert barrier options should include the following:

- Early in the contingency planning process, the Department recommended construction of a fire break similar to these proposals between the neck area and the North Quarry. At that time, Bridgeton Landfill and their contractors indicated that such a fire break would prove ineffective and soon fail due to movement and desiccation of the reinforced concrete. Has additional information been provided by Bridgeton Landfill to address these concerns?
- If the North Quarry is impacted by the subsurface fire, how does EPA plan to evaluate the effectiveness of the engineering controls (i.e., EVOH Cap, gas extraction and control system) should radiologically-impacted materials surface as the waste mass is reduced?
- Have feasibility evaluations been conducted with respect to hot spot removal of any radiologically-impacted materials in the North Quarry?
- The heat exchange tubes being considered for placement in the reinforced concrete do not appear to be a proven technology. Are there practical examples of such heat exchange tubes being used in similar applications?
- Given the historic subsurface fires in the North Quarry, was consideration given to using chilling or ground freezing technologies rather than adiabatic air coolers to ensure the area around the reinforced concrete barrier is maintained at a temperature to lengthen the

life of the non-combustible element? While mention is made to electrical continuity cables being installed at approximately 20 foot centers, the ability of the cooling elements to move and remain operable as shifting and/or deformation of the non-combustible element of the structure occurs from waste reduction settlement is not clear and needs to be further assessed.

- It is unclear why only on-site relocation of exhumed waste was considered. The sole safety factor expressed appears to be limiting the number of trucks leaving the facility. Was direct load and hauling of waste materials considered in these alternatives? This approach would limit odor generation as it relates to being a public nuisance, as well as avoiding undo bird attraction. Direct load and hauling would also greatly reduce the potential for a combustion event in any on-site areas of the relocated waste.
- It is also unclear whether consideration was given to limiting the size of the working face. This is routinely done in construction projects involving exposure of decomposing municipal wastes. Soil, foaming and other products can be applied to exposed wastes to assist in managing odors from excavation activities and reduces the area of exposed waste materials that might act as a bird attractant.

Given the existence of RIM in the northern portion of the North Quarry, evaluation of isolation barrier alignments in the southern-most portion of the North Quarry, or other engineering control options, need to be included in the analysis.

5.0 Option 2 – Air Gap Barrier

This option was not evaluated and comments are not provided.

7.0 Option 4 – Heat Extraction Barrier

Consideration with respect to the heat extraction barrier option should include the following:

- As noted in the alternatives above, the Heat Extraction Pilot Study is a study of an as-yet unproven, new technology.
- The potential for waste materials in the North Quarry to combust at a significantly higher temperature than waste materials found in the South Quarry does not appear to have been considered. What temperatures will the heat extraction (cooling) points be able to withstand? Can the heat extraction (cooling) points be constructed to connect to a chiller or freezing unit rather than an adiabatic air cooler?
- Potential impacts to the EVOH capping material and landfill gas wellfield and piping should combustion occur at higher temperatures than in the South Quarry.
- It is unclear if consideration was given to the potential for displacement of waste material and slope movements which could allow shifting of radiologically-impacted material in the North Quarry as the waste mass is reduced.

- Variability in the rate of movement of the subsurface fire has been a continuing issue. The movement rate assumed in the analysis appears to use current South Quarry measurements rather than maximum rates previously seen in the South Quarry. Any analysis designed to address a North Quarry fire must consider that the rate of movement could be at least as high as the fastest rate previously calculated for the South Quarry. Previous measurements have set that rate at 2.8 to 3.0 feet per day.

Thank you for giving us the opportunity to review and comment on this document. If you have any questions pertaining to this letter, please contact me with the Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102, or by phone at (573) 751-0763.

Sincerely,

DIVISION OF ENVIRONMENTAL QUALITY

Aaron Schmidt, P.E.
Division Deputy Director

AS/smm

Enclosure

c: Mr. Brad Vann, U.S. EPA, Region 7
Mr. Jonathan Garoutte, Department of Health and Senior Services
Mr. Paul Rosasco, Engineering Management Support Inc.
Ms. Rhonda Hamm-Niebruegge, Lambert-St. Louis International Airport
Mr. Chris Nagel, Director, Solid Waste Management Program

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November 21, 2014

Shawn Muenks, Program Manager
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Re: The Missouri Department of Health and Senior Services' comments on the document *Isolation Barrier Alternatives Analysis, West Lake Landfill Superfund Site*; October 10, 2014.

Dear Mr. Muenks:

The Missouri Department of Health and Senior Services (DHSS) has reviewed the referenced document and provides the following comments.

1. Attachment A: Radon Flux Analysis for Isolation Barrier Alternatives Analysis

   Attachment A, providing for radon flux estimates in the event a subsurface smoldering event (SSE) occurs, utilizes formula or model inputs that are outdated. The software package RAECOM, provided by World Information Service on Energy (WISE), is used in this document to estimate radon flux in the event of an SSE.

   The U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research provides the regulatory guide *Calculation of Radon Flux Attenuation by Earthen Uranium Mill Tailings Covers*, June 1989. This guidance appears to be the foundation for RAECOM. The International Atomic Energy Agency (IAEA) published Technical Reports Series number 474, *Measurement and Calculation of Radon Releases from NORM Residues*, 2013. This document provides updates on modeling radon emanation and exhalation from milling residues.

   DHSS recommends that RAECOM calculation and modeling assumptions be appraised against the IAEA updates, to determine if RAECOM is sufficiently protective of human health. In support of the updated RAECOM results, Argonne National Laboratory's RESRAD Offsite software should be used as an additional line of evidence to confirm the findings of the RAECOM modeling. The more stringent of the findings should be used for decision making.

   Regardless of the model used, all models pose some level of uncertainty. Due to this uncertainty, in the event an SSE occurs in the radiologically-impacted material (RIM), DHSS

recommends that environmental samples be collected to determine if levels of radon and its progeny pose unacceptable risk to workers and the public.

2. Attachment A, Figure 2-2, Average Radon Flux from Area 1 for Four Scenarios

This figure identifies a radon flux rate of 0.29 picocuries per meter squared per second ($pCi/m^2/s$) for the "ROD Remedy with SSE". However, the document does not provide calculations to support the assumptions. DHSS recommends reviewing comment 1 above, updating RAECOM as recommended, and presenting the additional line of evidence using RESRAD Offsite. These results should be reviewed by the Missouri Department of Natural Resources and/or DHSS prior to finalizing. Again, DHSS recommends collection of environmental samples to determine if the outcome is protective of human health.

If you have questions or comments, please contact Andrew McKinney at (573) 751-6102.

Sincerely,

Jonathan Garoutte, Chief
Bureau of Environmental Epidemiology

JG/DW/AM/