REGION 4
ATLANTA, GA 30303

November 5, 2025

VIA ELECTRONIC MAIL

Mr. Roger B. Petrie
Federal Facility Agreement Manager
Oak Ridge Office for Environmental Management
Department of Energy
Post Office Box 2001
Oak Ridge, Tennessee 37831

Dear Mr. Petrie:

The U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Department of Energy's (DOE) *Waste Acceptance Criteria Compliance Plan* (WACCP) *for the Environmental Management Disposal Facility* (EMDF) *at the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-3012&D1) received on August 4, 2025. The intent of the document as described in the EMDF Record of Decision (ROD) is to provide details regarding the development of waste acceptance criteria (WAC) and acceptance of waste at the EMDF through the application of WAC limits, Applicable or Relevant and Appropriate Requirements (ARARs), and the ROD, along with more extensive information regarding generating, accepting, and tracking the waste.

The EPA has the following comments on the WACCP for resolution prior to submittal of the D2 document. If you have any questions or comments, please contact me at (943) 212-7256, or electronically at sayer.john@epa.gov.

Sincerely,
JOHN SAYER
Digitally signed by JOHN SAYER
Date: 2025.11.05 16:18:58 -05'00'
John W.W. Sayer
Remedial Project Manager
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The following represents EPA comments on the EMDF Waste Acceptance Criteria Compliance Plan (WACCP) (DOE/OR/01-3012&D1):

General Comments

1. The EMDF Record of Decision (ROD) states that the remedy will meet certain Remedial Action Objectives (RAOs) that include the following:

    - Prevent exposure of people to CERCLA waste (or contaminants released from the waste into the environment) through meeting chemical-, location-, and action-specific Applicable and Relevant or Appropriate Requirements (ARARs), and by preventing exposure that exceeds a human health risk of 10-4 to 10-6 excess lifetime cancer risk (ELCR) or hazard index (HI) of 1;

    - Prevent adverse impacts to water resources (surface water and groundwater) from CERCLA waste or contaminants released from the waste through meeting chemical-, location-, and action-specific ARARs, and by preventing exposure that exceeds a human health risk of 10-4 to 10-6 ELCR or HI of 1.

    The WACCP discusses how various ARARs will be met, but further clarification is needed in the document on how the WACCP will ensure the human health of 10-4 to 10-6 ELCR or HI of 1 is met and tracked through the waste acceptance process.

2. Waste Handling Plans (WHPs) are discussed in the EMDF ROD as part of the waste acceptance process and are used as an example of where the EPA and Tennessee Department of Environment and Conservation will have continued involvement and approval of waste disposal at EMDF. WHPs are also a requirement of the Federal Facility Agreement for the Oak Ridge Reservation (FFA) detailed in Appendix I-14. However, the WACCP does not discuss the use of WHPs, and references the data quality objectives (DQO)/data quality assessment (DQA) process prior to authorization of shipments of CERCLA waste to EMDF. EPA recommends additional discussions and clarification on this matter.

3. The WACCP uses the Supplemental Analysis (SA) (UCOR-5843) to demonstrate that the estimated EMDF radionuclide inventory meets the CERCLA risk range and that projected non-cancer risks (HI) are within acceptable limits. The SA was issued as a secondary document by DOE in July 2025, and the EPA submitted comments on October 28, 2025. Please note, as the WACCP relies on the SA for the basis for meeting the CERCLA risk range, there is inevitably cross-over between some of these comments and EPA's SA comments.

4. The auditable safety analysis (ASA) is mentioned throughout the document and directly influences the Waste Acceptance Criteria (WAC). However, the origin of the ASA requirements

is not specifically mentioned in the WACCP. Please refence the specific origin of these requirements in the document.

Specific Comments

1. **Figure 1, EMDF Conceptual Landfill Design, Page 1** – The gridded line marker that highlights the location of the EMDF is not readily evident. It is recommended that the grid lines be darkened for visibility and ease of identification of the boundary, especially where the boundary seems to intersect wetland areas. The figure can also benefit from an arrow and/or text box that clearly identifies the EMDF location.

2. **Section 1.1, Overview, Page 2** – This section describes the analytic waste acceptance criteria (WAC) and states, "The analytical WAC will be evaluated on individual waste lots and their impact to the overall volume weighted sum-of-fractions (VSWF) for the entire disposal facility." Please elaborate on what this evaluation entails, and particularly, whether the volume-weighted sum-of-fractions approach will be applied to each radionuclide and chemical versus combined waste volume (radionuclides and non-radionuclides) per waste lot when assessing the impact.

3. **Section 1.1, Overview, Page 3** – states, "In addition, trigger level facility average concentrations have been defined for total uranium and for mercury based on the toxicity projections reported in the EMDF Supplemental Analysis. EMDF trigger levels provide a basis for initiating an evaluation of additional risk management activities in the event that actual or forecast average concentrations of the total EMDF waste disposed to date approach the trigger level." Please provide additional text that describes what the additional risk management activities consist of and/or provide a reference to the section or document that contains this information.

4. **Section 1.2 Background, Page 4** – states, "Trace quantities of some transuranic (TRU) radionuclides (e.g., plutonium and americium) are also predicted in ORNL waste. This is important for estimating the EMDF radiological inventory because Y-12 waste accounts for approximately 70% of the forecasted waste volume and ORNL waste accounts for the remaining 30%. Due to these differences in waste volume and radiological characteristics, Y-12 waste accounts for most of the uranium activity in the expected EMDF inventory, whereas ORNL waste accounts for most of the expected total radionuclide curie inventory." Please state whether waste from potential remedial actions at the Bear Creek Burial Grounds was considered in the forecasted radiological inventory from Y-12 since waste from any remedial action in the burial grounds could potentially contain large quantities of uranium that would increase the projected curie inventory from Y-12.

5. **Section 1.2, Background, Page 4** – states, "Visible recoverable liquid mercury and waste with sample results above mercury hazardous waste levels will be segregated and disposed of offsite." Please specify where the liquid mercury waste will be disposed of offsite.

6. **Section 2.0, Scope and Purpose, Page 7** - states, "[T]he characterization data is ultimately compiled and evaluated through the DQA process outlined in Data Quality Assessment: A Reviewer's Guide (EPA QA/G-9R)." Please state how such DQAs are documented and where the DQA documentation/reports will be found for EMDF-bound waste lots.

7. **Section 2.0, Scope and Purpose, Page 8** – lists WACCP objectives and states "Assurance that adherence to all administrative requirements will result in waste that is compliant with ARARs in the ROD, and from other agreements between DOE, EPA, and TDEC; otherwise referred to as "triparty agreement". Please provide specific information about which agreements are referred to here. In addition, please revise this bullet to specifically list the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) mandated FFA as the primary tri-party agreement.

8. **Section 2.0, Scope and Purpose, Page 8** - the second bulleted item states "Compliance with all applicable federal and state regulations, DOE Orders and authorizations, including requirements outlined in DOE O 435.1, Radioactive Waste Management; State of Tennessee hazardous waste regulations; and other relevant state and federal regulations." Please provide a reference to where all of the reference 'applicable federal and state regulations' are listed.

9. **Section 2, Scope and Purpose, Page 8** – this sections states that the WACCP objectives are tailored to "provide analytic criteria designed to meet risk parameters that are derived from the approved risk assessment model results provided in the ROD and other triparty agreement for the EMDF." Please provide a reference to the report that houses the risk parameter inputs and model results (i.e., Supplemental Analysis report).

10. **Section 3.0, Roles and Responsibilities, Page 9** - the second paragraph states, "EMDF WAT provides independent oversight of generator compliance with the EMDF WAC in the form of surveillances and assessments with an emphasis on characterization, waste traceability, anomaly detection processes, and waste packaging and transportation. Results from assessments are reported to DOE OREM while any corrective actions assigned are tracked through completion." Please provide a reference for the procedures that the WAT uses to perform these audits/assessments.

11. **Section 3.0, Roles and Responsibilities, Page 9** – with reference to the WAT function in the above comment, which Quality Assurance Program Plan defines how this quality function is performed? Please note, such a QAPP should demonstrate the independence of the WAT team from the operations staff and describe the requirements of the audit and assessment program.

12. **Section 4.1.1, ARARs, Table 2. Administrative waste acceptance criteria, Page 19** – the note in the table states "LDR requirements have associated numerical or technology standards that

must be met prior to land disposal; see ARARs in Table A.3 and appropriate citations given there." Please add to this note that the Table A.3 is in the EMDF ROD, and not Table A.3 of the WACCP.

13. **Section 4.2, Analytical WAC, Page 33** – This section states, "The dose projections based on the estimated EMDF activities are used to back-calculate protective WAC tied to specific regulatory targets." It is unclear what regulatory targets (e.g., ROD standards, DOE trigger level concentrations for total uranium and mercury, etc.) are being inferred and whether changes to the dose projections would result in changes to the analytical WAC. Please explain.

14. **Section 4.2.1, Waste Concentration Limits (Step 1 – Screening Criteria), Page 34** – this section discusses calculating a sum of the ratios of the average concentration of each contaminant in a waste lot to its corresponding waste concentration limit to normalize the data. Please describe how the average concentration of each contaminant for each waste lot is derived statistically. EPA guidance recommends use of the 95 percent upper confidence limit (UCL) to calculate reasonable maximum exposure (RME) in comparison of the hypothetical inadvertent human intruder.[1]

15. **Section 4.2.1, Waste Concentration Limits (Step 1 – Screening Criteria), Page 34** –please explain how concentrations of non-radionuclides mixed with activity readings for radionuclides will be assessed in the sum of fractions approach. Additional information is needed to ensure that high concentrations or activity levels of a single or subset of contaminants comprising a specific waste lot volume does not get masked or diluted by other radioactive isotopes or chemical analytes (including Uranium metal toxicity) or other analytes for disposal that were not currently forecasted that may be identified in future waste removal actions.

16. **Section 4.2.4, Supplemental Analysis Risk Summary, Page 36 -** states, "The fish ingestion risk is primarily due to C-14, Pu-238, Pu-239, and Pu-240 because of the high bioconcentration factor default values applied by the calculations for carbon and plutonium. As a measure of sensitivity to the applied bioconcentration factor value for the radionuclide risk, the last row of Table 7 shows the total cancer risk assuming only 10% of the calculated C-14, Pu-238, Pu-239, and Pu-240 fish contribution. These values are equally likely to be representative of Bear Creek impacts and are all on the order of 1.0E-05 ELCR." Please provide the basis for using 10% of the calculated bioconcentration factors. Additionally, please explain what is meant by "equally likely to be representative of Bear Creek impacts".

17. **Section 4.2.4, Supplemental Analysis Risk Summary, Page 36 –** states, "The Supplemental Analysis shows that the estimated EMDF radionuclide inventory generally meets the CERCLA risk range for the release and exposure scenario analyzed. The Supplemental Analysis

[1] EPA (1992), *Supplemental Guidance to RAGs; Calculating the Concentration Term*, Intermittent Bulletin Volume 1 Number 1, Publication 9285.7-081, Office of Solid Waste and Emergency Response, U.S. EPA, May 1992.

considered the potential non-cancer risks associated with the presence of toxic metals (e.g., uranium and mercury) and found the projected risks (HI) are within acceptable ranges. Therefore, no specific analytical WAC limits are warranted for metals toxicity other than the protective limits provided in EPA's RCRA LDRs that are universally used for disposal of waste into both Subtitle D and Subtitle C landfills." The SA used an estimated facility average EMDF waste concentrations at closure for a specific suite of metals based on the Environmental Management Waste Management Facility (EMWMF), Y-12 and ORNL waste lot data and current EMWMF inventory tracking data through 3/31/2025. Ensuring that the remedy meets the CERCLA Risk Range including the hazard index for toxicity is a RAO of the EMDF ROD. EPA recommends that an inventory limit for toxicity is calculated, and progress tracked with actual EMDF waste disposal data to document the RAO is being met in the event that historic data does not represent future waste disposal at EMDF. EPA notes that this metric is already tracked at the EMWMF.

18. **Section 4.2.5, EMDF Trigger Level Concentrations and Contingent Risk Management Activities, Page 37** – states, "EMDF trigger levels provide a basis for initiating evaluation of the need for additional risk management activities in the event that actual or forecast average concentrations of the total EMDF waste disposed to date begin to approach the trigger level. Trigger concentration levels have been defined for total uranium and for mercury based on the toxicity projections reported in the EMDF Supplemental Analysis. The trigger level for total uranium is 800 mg/kg, and for mercury the trigger level is 1000 mg/kg." The role of trigger levels and how they are developed is unclear. How do trigger levels differ from tracking HI by the VWSF as already done at EMWMF and what is the advantage of this approach? See also specific comment 17 above.

19. **Figure 6, EMDF WAC Contingency Plan, Page 38** – The first decision step in the EMDF WAC Contingency Plan is to evaluate uranium and mercury inventory results to determine whether the results exceed the individual trigger/screening levels. If the results exceed the trigger/screening level, an evaluation of the potential lifecycle impacts from these elevated levels ensues. However, if results are below the trigger/screening levels, the uranium and mercury results would be reevaluated and rescreened. It is unclear how many times uranium and mercury results below the trigger/screening levels get reevaluated against the screening levels in lieu of proceeding to continued monitoring and quarterly evaluation.

20. **Section 5.2, Characterization Requirements, Page 44** – states, "Waste streams having activity concentration of radionuclides in the final waste form at 1% or greater of the total activity shall be reported." Please clarify this statement by defining how the 1% applies – i.e., is this referring to 1% of the total activity of the waste lot being evaluated?

21. **Section 5.3 Data Collection Requirements, Page 46** – states, "Also, sampling efforts to support CERCLA site investigations often involve the collection of biased samples to identify and bound

site conditions instead of being tailored at determining site average concentrations of a waste lot." While this may be true, it is recommended this statement be modified to state that where statistics are used to estimate averages, only non-biased data may be used to derive population parameters estimators such as averages. Please include a description of how data is selected to calculate site average concentrations for a waste lot.

22. **Appendix C.2., Determination of Site-Related Contaminants, Page C-5** – It is recognized that a combination of random and judgmental sampling is implemented to characterize diverse waste streams under a single waste lot as described in Section 5.3.1.1. Please note that EPA guidance recommends that the 95% UCL is used as being representative of RME (see specific comment 14).