STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Remediation, Oak Ridge Office
761 Emory Valley Road
Oak Ridge, Tennessee 37830

February 26, 2025

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

TDEC Comments: Baseline Groundwater Monitoring Report for the Environmental Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee (DOE/OR/01-2021&D4)

Dear Mr. Petrie

The Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) reviewed the subject baseline groundwater monitoring report in accordance with the *Federal Facility Agreement (FFA) for the Oak Ridge Reservation (ORR)*.

During review of groundwater data in 2017, TDEC agreed there is no indication that contaminants are leaking to groundwater from EMWMF. However, for the past decade, TDEC has highlighted the need to revise the baseline data used for detection monitoring. Upon approval of this report, the revised baseline data will support improvements in the evaluation of potential impacts to groundwater from landfill operations. This will reduce uncertainties and bolster confidence in the long-term protectiveness of the EMWMF.

TDEC understands DOE is revising the Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) to comply with legal requirements for managing landfill wastewater discharges in accordance with the U.S. Environmental Protection Agency (EPA) Administrator's December 31, 2020, decision. TDEC also understands the detection monitoring program described in the SAP/QAPP will incorporate the revised groundwater baseline/evaluation values.

TDEC offers the following comments for the U.S. Department of Energy (DOE) to resolve in finalizing the document.

General Comment

1. **Relationship of Baseline Groundwater Monitoring Report and Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP)/EGS**

   The first sentence of Section 4 states the baseline/evaluation values documented in the baseline groundwater monitoring report are implemented through the EMWMF SAP/QAPP. TDEC supports this approach and advocates for timely finalization of the baseline report so that it may be cited in the next version of the SAP/QAPP. Ideally, the baseline report will be finalized and approved before, or contemporaneously, with the SAP/QAPP and the Remedial Action Work Plan (RAWP) containing it.

Specific Comments

1. **Page ES-1, 1st Paragraph, last sentence; 5th Paragraph, last sentence; and Page 3, 1st Paragraph, 2nd Sentence**
   For clarity and specificity, change *the environment* to *groundwater*.

2. **Page ES-1, 6th Paragraph**
   Add *or latest revision* since the cited SAP/QAPP version should be superseded soon.

3. **Page 4, 3rd Paragraph, 2nd Sentence**
   Revise the wording for clarity. The first part of the sentence states there *are* three NTs (present tense), and the second part of the sentence states NT-4 *was* located between Cells 2 and 3 (past tense). The upstream portion of NT-4 was covered by landfill expansion. The lower section still exists, although its channel has been modified.

4. **Page 4, 4th Paragraph, 1st Sentence**
   Revise the wording for accuracy. EMWMF is neither north nor upgradient of the S-3 Ponds, nor is it north of the Bear Creek Burial Grounds (BCBG).

5. **Page 7, Section 2, 1st Paragraph**
   Add a sentence at the end of the paragraph explaining that details of the approaches described in this section were developed in collaboration with, and agreement of, the FFA parties.

6. **Page 7, 1st Paragraph, 1st Sentence**
   Revise the wording for clarity by removing the reference to a specific version of the SAP/QAPP. The revised baseline/evaluation values were not included in the SAP/QAPP revision (DOE/OR/01-2734&D1/UCOR-4156/R3) approved by EPA and TDEC for interim use. The revised values were included in the subsequent revision (DOE/OR/01-2734&D1/R1), but that version was never approved by EPA or TDEC.

7. **Page 7, Section 2.1, 1st bullet**
   Change *NT-04* and *NT-03A* to *EMWNT-04* and *EMWNT-03A* for consistency.

8. **Page 7, Section 2.1, 3rd bullet**
   Show the former location of GW-923 on Figure 2 and symbolize it as plugged and abandoned.

9. **Page 7, Section 2.1, 5th Paragraph (below bullet list), 3rd Sentence**
   Change *consistent* to *associated*.

10. **Page 8, Last Bullet**
    a. The text states data distributions are *assumed* to be normal, lognormal, and gamma. These are common forms of parametric distribution. However, some environmental data are more appropriately represented as non-parametric distributions. If the potential for skewed or heavily tailed distributions was evaluated, the text should document that effort.
    b. Revise the document to discuss the results of the distribution fitting—i.e., how the appropriate distribution or lack of distribution was assigned for each COC.
    c. Provide more detail regarding how ROS estimates were calculated, including regression types used, any assumptions involved, and how these factors may affect the goodness-of-fit tests. For example, the report should summarize how the ROS method manages non-detects during distribution fitting and whether different distributions or high proportions of non-detects affect the approach. If applicable, the report should also state how the ROS approach was compared with other imputation methods for sensitivity analysis.

11. **Page 11, Section 3.1**
    a. Confirm that the subsections for individual analytes address all 16 sampling locations listed in the first paragraph or revise the subsections to explain any exclusions. For example, Section 3.1.3 discusses 13 chromium sampling locations and excludes one sampling location. There is no explanation regarding the other two sampling locations.
    b. Revise the subsections to be consistent with each other. Several subsections mention state and/or federal numerical criteria while others omit these values. For example, Section 3.1.1 (arsenic) should acknowledge the maximum contaminant level (MCL) of 0.010 micrograms per liter (µg/L). Other subsections omit numerical criteria, including but not limited to 3.1.8 (Iodine-129) and 3.1.10 (Technetium-99).

12. **Page 11, Section 3.1, 1st Paragraph, 2nd Sentence**
    a. Clarify what is meant by *populations* (in this sentence and throughout the report, as appropriate). If the word was being used in the statistical sense, it would mean the entire group of data being analyzed. In this report, it appears to represent a subset of the population.

b. The text states that "statistics were performed for the populations identified for the COCs." Revise the statistical approach description in Section 2.2 to explain how the populations were identified and analyzed statistically.
c. Revise subsections in Section 3.1 to describe how distinct population determinations are made and the results of these determinations for COCs with multiple populations.

13. **Page 11, Section 3.1, 2nd Paragraph**
    a. The text indicates baseline/evaluation values were not determined for total uranium because the individual isotopic analyses are more sensitive for determining changed conditions. TDEC agrees. However, TDEC recommends that the baseline report document a total uranium baseline/evaluation value in addition to the isotopic values because the total uranium concentration has a health/risk-based level (MCL) for groundwater.
    b. Consider moving the second sentence to Section 2.2 since it discusses the approach used to select statistical approaches.

14. **Page 11, Section 3.1.2**
    The baseline/evaluation value selected for cadmium (Section 3.1.2 and Table 1) is 10 times higher than any value of UCL or UTL in Appendix A, Table 2. Revise the document to explain how the baseline/evaluation value for cadmium was set to 0.003 milligrams per liter (mg/L).

15. **Page 11, Section 3.1.3**
    Although the text indicates chromium results are considered a single group for baseline purposes, revise the wording to clarify the number of populations identified. Alternatively, consider deleting the words regarding the number of populations and using wording similar to that of Section 3.1.4. The text states two populations were identified, but Table 3 in Appendix A shows four statistically similar populations. Two populations, indicated by orange and blue, consist of a single well location each.

16. **Page 11, Section 3.1.7**
    a. The value for the UTL 98/98 for Group 2 Nickel in Table 7 of Appendix A is 0.004. The value for UTL 98/98 for Group 2 Nickel in Table 1 is 0.005. Revise the document to explain the difference or ensure consistency.
    b. Although the text indicates nickel results are represented by two statistically significant groups for baseline purposes, revise the wording to clarify the number of populations identified. Alternatively, consider deleting the words regarding the number of populations and using wording similar to that of Section 3.1.4. The text mentions four populations, including a single well (GW-965) with insufficient detections for statistical evaluation, but Table 7 in Appendix A shows five populations. Two populations, indicated by orange and blue, consist of a single well location each.
    c. At the end of the first paragraph, add *for the protection of domestic water supply*.

17. **Page 12, Section 3.1.5**
    Similar to nickel, the State has a general-use water quality criterion (Rule 0400-40-03-.03) for lead of 5 µg/L or 0.005 mg/L. The baseline/evaluation value of 0.015 mg/L exceeds the state criterion. Revise the text to explain the selection of a baseline/evaluation value that is greater than the water quality criterion.

18. **Page 12, Section 3.1.8**
    Revise this section to include the Iodine-129 MCL of 1 picocurie per liter (pCi/L). The baseline/evaluation value of 5.3 pCi/L exceeds the MCL. Revise the text to explain the selection of a baseline/evaluation value that is greater than the MCL.

19. **Page 13, Section 3.1.9**
    Revise the text to correct the MCL for Strontium-90, which is 8 pCi/L.

20. **Page 15, Table 1**
    For reference, add state and/or federal numerical criteria for each COC. Inclusion of these values will support comparison among the baseline/evaluation values, numerical criteria, and practical quantitation levels (PQL).

21. **Page 15, Table 1, Lead**
    For consistency with other COCs, consider replacing text in the comment column with that used for the other metals (except nickel). Alternatively, explain the relevance of specifying the number of populations for lead only.

22. **Page 15, Table 1: I-129, Sr-90, and Tritium**
    For consistency with other COCs, add *Selected for all populations based on review of data* as the first sentence in the comment column for each of these rows.

23. **Appendix A, Table Numbers**
    Revise table numbers in Appendix A to match their citations in the text. For example, Section 3.1.1 (page 11) cites Table A.1, but the relevant arsenic information is in Table 1 of Appendix A. There is no Table A.1.

Questions or comments concerning the contents of this correspondence should be directed to Brad Stephenson at the above address, by phone at 865-352-1235, or by email at brad.stephenson@tn.gov.

Sincerely

Randy Young Digitally signed by Randy Young
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