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

October 21, 2022

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

Comments: *Field Sampling Plan for Baseline Groundwater and Surface Water Characterization at the Proposed Environmental Management Disposal Facility, Oak Ridge Tennessee* (DOE/OR/01-2812&D1)

Dear Mr. Petrie

The Tennessee Department of Environment and Conservation (TDEC), Division of Remediation-Oak Ridge Office, received the subject Field Sampling Plan (FSP) on March 15, 2019. In our letter dated March 28, 2019, TDEC committed to review the FSP upon approval of a Record of Decision (ROD) that selects onsite disposal of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste in the Environmental Management Disposal Facility (EMDF). TDEC approved the EMDF ROD on September 15, 2022, and the ROD was fully executed when the U.S. Environmental Protection Agency (EPA) signed on September 30, 2022.

Following ROD approval, TDEC reviewed the FSP. Based on that review, the state offers the following comments and requests prompt resolution in a revised plan. Baseline sampling should begin as soon as possible. Ideally, sampling would begin before significant land disturbance associated with site preparation or the planned groundwater field demonstration. In any case, the likelihood that dry wells and/or streams will prevent sampling during some events should drive a timely start to ensure development of a statistically meaningful baseline data set before landfill operations begin.

1. **Page 7, Section 2.6, 2nd paragraph and 1st bullet**
   In compliance with TDEC 0400-40-03-.05(8), revise the text to state threshold/evaluation values for non-naturally-occurring COCs will be based on "sufficiently sensitive" analytical methods with quantitation limits low enough to detect and measure constituents at, or below, applicable water quality criteria limits. Revise Table 3 and corresponding text on pages 17 and 25 accordingly.

2. **Page 7, Section 2.6, last paragraph**
   Revise the text to explain how results are determined to be outliers. If the procedure is documented in another plan, cite that document.

3. **Page 7, Section 2.7, last paragraph**
   For clarity, change *...downstream from the creek headwaters...* to...*downstream from the Bear Creek headwaters....*

4. **Page 8, Figure 3**
   a. As acknowledged on page 4 and consistent with various DOE publications, a component of EMDF groundwater flow likely moves toward the west (grid direction) or southwest (true direction) along the geologic strike of the fractured bedrock and saprolite. TDEC expects the future detection monitoring well network will include at least three shallow/deep well pairs along the western/southwestern landfill boundary. Therefore, TDEC recommends another shallow/deep well pair in the baseline monitoring network near the northwestern/western corner of the landfill footprint—i.e., uphill from the planned location of GY-033/034.

   b. Are any of the existing site characterization piezometers—not shown on the map—suitable for baseline groundwater sampling? Piezometer construction information presented in TM-2 suggests they may fit for sample collection.[1] Some existing piezometers appear to be outside the planned landfill footprint. If those piezometers are not used for baseline groundwater sampling, DOE should consider continuing groundwater level recording at those locations to support baseline monitoring and the groundwater field demonstration.

   c. Add a north arrow, and indicate whether it represents true north or grid north.

   d. Define the polygons in the legend.

5. **Page 11, Section 3.1**
   a. TDEC understands it may not be practical to retain all baseline wells for subsequent use in the detection monitoring network. However, TDEC recommends the baseline wells be installed following the same procedures that will be used for drilling, borehole characterization, and construction of the detection monitoring wells. This will maximize consistency between the baseline and detection monitoring data sets, as well as the potential for using baseline wells in the detection monitoring network.

   b. Given the fractured nature of the bedrock and saprolite at the EMDF site, screen intervals for baseline monitoring and detection monitoring should be determined by the FFA parties based on borehole characterization results. This approach was successful during previous site characterization efforts, as documented in TM-2.

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[1] *Technical Memorandum #2, Environmental Management Disposal Facility Phase 1 Monitoring, Oak Ridge, Tennessee (DOE/OR/01-2785&D1) and Responses to Comments on Technical Memorandum #1, Environmental Management Disposal Facility Phase 1 Monitoring, Oak Ridge, Tennessee* (DOE/OR/01-2785).

c. Revise the text to provide additional explanation of the rationale for 15-foot (ft) screened intervals in the shallower wells. It is unclear whether the intent is to increase the number of fractures encountered and associated groundwater yield or to maximize the volume of water available in the well for sampling. Ideally, adequate borehole characterization will identify the appropriate zones for low-flow monitoring, minimizing the need for longer well screens. It will also minimize the volume of water to be purged for wells requiring the removal of three casing volumes.

d. Similarly, revise the text to provide additional explanation of the rationale for 30-ft screened intervals in the deeper wells.

e. What is the rationale for using stainless steel casings and screens? Available guidance and literature indicate polyvinyl chloride (PVC) materials are generally better suited for groundwater monitoring, particularly for radionuclides and metals, unless volatile organic compounds are expected to be present at very high concentrations.

f. TDEC recommends initiation of baseline sampling before significant land disturbance. Revise the plan to clarify whether the project schedule aligns with this recommendation.

g. The plan should also indicate whether any clearing will be necessary to install the baseline well network and, if so, how tree removal will be scheduled to follow this key recommendation from TDEC's *Acoustic Survey of Bats at the Proposed EMDF Site 7a/7c, Bear Creek Valley, Oak Ridge Reservation* (Feb. 2017).

> Seasonal timber removal should be coordinated with the USFWS during the consultation process. The USFWS has published a framework suggesting timber removal at a project site should only occur during the fall/winter season (bat hibernation period). In other words, trees should not be harvested during spring/summer season when bats are using trees (and forests) for foraging, roosting, and while females are raising their young (USFWS 2016a, 2016b, 2016c).

6. **Page 13, 1st sentence**

The *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D4/R1) [FFS] states landfill wastewater discharge limits will be calculated when the discharge location and Bear Creek flow rates are determined. Regardless of the point of discharge, it will be necessary to monitor Bear Creek surface water during landfill operations. Therefore, TDEC recommends baseline surface water sampling in Bear Creek at the existing station at the NT-11 confluence and a new station at the NT-10 confluence. TDEC supports the plan to sample surface water in NT-10 and NT-11 to support detection and/or operational monitoring and in case landfill wastewater is eventually discharged to one or both streams.

7. **Page 13, Section 3.2, 2nd sentence**
   TDEC recommends deleting the sentence. Baseline monitoring should establish a statistically defensible data set, which requires more than four data points for each COC. If four results fail to adequately represent a COCs baseline variability, there is a risk that detection monitoring results may trigger undue concern. This is particularly true if a COC is not detected during the first four quarterly sampling events and the baseline value is established at the project quantitation limit. Collection of more than four results will support evaluation of how frequently to sample a COC during detection monitoring. For example, multiple (more than four) non-detect results may support sampling a COC less often once detection monitoring begins.

8. **Page 14, Table 2**
   Baseline monitoring should include all analyses planned for detection monitoring. Therefore, Table 2 should include analyses documented in Table K.1.16 and Appendix C, Attachment 4 of the *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D4/R1) [FFS]. It appears the following surface water analyses should be added to Table 2.

   - Ammonia Nitrogen, Total as N
   - Hardness as $CaCO_3$, mg/l
   - Nitrogen, total (as N)
   - Phosphorus, total as P
   - Total Suspended Solids
   - Whole effluent toxicity – chronic/acute

9. **Page 15**
   For clarity, reword *Qualified and trained personnel with all specialized training requirements will perform...* as follows: *Qualified personnel with all required specialized training will perform...* or *Qualified and trained personnel meeting all specialized training requirements will perform....*

10. **Page 15, Section 4.1.2, 3rd and 4th paragraphs**
    Consider switching the order of these paragraphs because low-flow sampling is mentioned first and is the preferred sampling method.

11. **Page 15, Section 4.2**
    Baseline sampling should begin as soon as possible, given the need for a statistically meaningful baseline data set before landfill operations begin and the likelihood that dry streams will prevent data collection during some sampling events.

12. **Page 24, Table 4**
    Check the well dentification numbers in each column (deep and shallow) and correct if needed. They match Figure 3, but the last two deep well numbers are odd, whereas the first four are even.

11. **Editorial Suggestion**

p. 16, Section 4.4, 2nd paragraph, 1st sentence: Change *The list...are found...* to *The list...is found....*

TDEC looks forward to working with the FFA parties to establish effective baseline data sets for groundwater and surface water at EMDF. Questions or comments concerning this letter should be directed to Brad Stephenson at the above address, by email at brad.stephenson@tn.gov, or by phone at (865) 220-6587.

Sincerely

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