



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

July 23, 2026

Mr. Roger Petrie
Federal Facility Agreement Manager
Oak Ridge Office of Environmental Management
U.S. Department of Energy
PO Box 4067
Oak Ridge, TN 37831

RECEIVED
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COUNTY MAYOR'S OFFICE

Dear Mr. Petrie

**RE: 2026 Remediation Effectiveness Report for the U.S. Department of Energy Oak Ridge Site
Oak Ridge, Tennessee (DOE/OR/01-3018&D1)**

The Tennessee Department of Environment and Conservation (TDEC), Division of Land Protection – Remediation Branch, Oak Ridge Office has reviewed the above referenced document pursuant to the Federal Facility Agreement (FFA) for the Oak Ridge Reservation (ORR). This letter meets the FFA review cycle protocol of 90 days for the subject document. The following comments are relevant to that review.

General Comments

1. Significant effort in this document is spent evaluating contaminant concentration trends at numerous groundwater wells associated with specific remedial/removal action projects that did not include remedial action objectives (RAOs) or applicable or relevant and appropriate requirements (ARARs) to address groundwater. The scopes to address groundwater cleanup are intended to be addressed separately under future groundwater specific Records of Decision (RODs). Despite this, groundwater is used significantly to illustrate a story about the contamination and impacts associated with the remedial/removal actions being addressed within this Remediation Effectiveness Report (RER).
 - a. An evaluation of contaminant impacts at specific monitoring wells over 5-and 10-year timelines, and corresponding determinations of stable, increasing, or decreasing trends at these monitoring wells is presented and discussed throughout this document. While trend analysis is potentially illustrative for specific monitoring wells over time, any conclusions regarding overall plume degradation, attenuation, or groundwater stability are not defensible.
 - b. While decreasing trends at individual wells may (as is alluded to in this document) show evidence of natural attenuation and volatile organic compounds (VOC) plume degradation over time, these trends may just as likely show plume movement and ongoing contaminant migration. Without the delineation of groundwater conditions required to evaluate contamination in groundwater (including those required to assess

for potential for natural attenuation to occur in groundwater), the continued reference to the *positive nature of decreasing trends* is premature and not defensible.

- c. Stable concentrations at a location with no additional plume delineation or groundwater flow assessment does not mean that there is no further impact of the source materials to the groundwater. It may just as easily mean that there is steady continued impact to a migrating water column with an increasing plume footprint over time.
- d. Without additional plume delineation and evaluation of groundwater conditions, an assertion that a ROD goal of "minimize further impact to groundwater" has been met, is not defensible.

Please include a discussion on the limitations of evaluating trends at individual wells without additional plume delineation and evaluation of groundwater conditions.

- 2. To help support continued groundwater analysis/evaluation across the ORR and to help define and collect data intended to support groundwater contamination evaluations and future decisions, TDEC requests a meeting to discuss revisiting the 2014 Groundwater Strategy (DOE/OR/01-2628/V1&D2).
- 3. The groundwater protection RAO in the ROD for Interim Actions in Bethel Valley (BV IROD) (DOE/OR/01-1862&D4) which includes a protection goal to "minimize further impacts to groundwater" should drive additional groundwater assessment actions to appropriately evaluate if this RAO goal is satisfied. The text associated with each of the groundwater summary tables provided in this RER should be revised to acknowledge that this RAO cannot be measured with current performance measurements. Note, as stated on page 1-9, "Full delineation of the nature and extent of groundwater contamination is incomplete in many areas of the ORR. The FFA parties will continue to work together in the future to identify projects that improve the understanding of groundwater flow pathways and contaminant migration based on a continually refined groundwater strategy."
- 4. As described in Section 1.5 (page 1-13) of this document, text within the performance monitoring discussion does acknowledge the following groundwater expectations:

The CERCLA National Oil and Hazardous Substances Pollution Contingency Plan requires federal SDWA [Safe Drinking Water Act of 1974] MCLs [maximum contaminant levels] and non-zero MCL goals (MCLGs) be attained for all RAs [remedial actions] for groundwaters that are current or potential sources of drinking water, where the MCLs/non-zero MCLGs are relevant and appropriate under the circumstances of the release (40 CFR 300.430(e)(2)(i)(B)-(C)). Additionally, TDEC 0400-40-03-.07(4)(b) designates all groundwater in the state as General Use Groundwater (except for groundwater that has been specifically designated otherwise); thus, this General Use Groundwater designation would apply to groundwater within the Oak Ridge NPL [National Priorities List] Site footprint. Groundwater designated as General Use must meet the state's numeric WQC [water quality criteria] under TDEC 0400-40-03-.03(1)(j) for surface waters classified as a Domestic Water Supply and must contain no other constituents that pose an unreasonable risk to public health or the environment (TDEC 0400-40-03-.08(2)). Chemical-specific WQC set out in TDEC 0400-40-03-.03(1)(j) reflect the MCL levels, except for the Tennessee MCL for lead, which is more stringent at 5

µg/L and the federal MCL for nickel, which is 100 µg/L. The federal nickel MCL was withdrawn in 1995. Unless stated otherwise, the most stringent of the state groundwater WQC or federal/state MCLs for groundwater are used in this RER for comparison to groundwater data.

Please be consistent in using these groundwater expectations when evaluating data; even if only as a screening or additional assessment not defined in the Interim RODs (IRODs). For example, the above criteria are all related to general use groundwater, drinking water standards, and SDWA requirements. As such, the constituents evaluated outside of this list, such as Sr-90 and Tc-99, should retain similar water quality expectations. Specifically, residential preliminary remediation goals (PRGs) should be used for summary rather than industrial PRGs for groundwater comparisons as there is not an industrial groundwater component to this site. Please evaluate summary tables including but not limited to Table 2.11.

5. The Bear Creek Valley Phase I ROD specifies that the implementation of the ROD is expected to meet ambient water quality criteria (AWQC) for the protection of surface water throughout Bear Creek, however none of the tables of detected analytes throughout Section 4 (i.e., Tables 4.5, 4.6, 4.7, 4.10) present AWQC screening criteria. Please revise the tables to include AWQC screening criteria along with ROD-based goals.
6. Considering that the surface water from Bear Creek Valley Zone 3 tributaries ultimately impacts surface water in Bear Creek in all downstream zones, the U.S. Department of Energy (DOE) should use the same residential scenario-based risk-based concentrations (RBCs) that are used for the downstream zones. Please revise the RBCs for Zone 3 to match the RBCs used for Zones 1 and 2.

Specific Comments

Executive Summary

1. Please edit this section as needed to reflect any changes made in other sections as a result of the following comments.

Section 1.0 Introduction

2. **Page 1-3, Figure 1.1**

The Oak Ridge NPL Site boundary in this figure differs significantly from the boundary depicted in the 2025 RER. Please provide clarification on why this boundary changed and what is meant by Historic ORR Boundary in this figure.

3. **Page 1-8, last paragraph**

Please revise the sentence that states *RAs that have successfully prevented the spread to RAs that have been implemented to address the spread*. Because groundwater plumes remain undefined, the statement 'successful prevention' of migration of groundwater impacts across the reservation is not substantiated. Significant efforts through early decisions have been successful in reducing migration from areas with significant problems. For example, capping waste storage areas where source material remains in water does not prevent the spread of contamination. The current interim measures and single source actions are reducing inputs, but the term successfully prevent is misleading.

4. **Page 1-15, Section 1.5.2, last sentence**

This section states that “only contaminants with concentrations greater than, or equal to, the MCL/MCL-DC [maximum contaminant level-derived concentration] in FY 2025 are presented in the summary tables.” Reporting should identify all exceedances of MCLs over time and not only be limited to FY 2025 including trend discussions. Revise the document to include groundwater trend evaluations for contaminants with MCL/MCL-DC exceedances over the entire 10- to 5-year time periods.

Section 2.0 ORNL – MV

5. **Page 2-10, Table 2.2**

One RAO identified for Melton Valley is protection of ecological receptors, with a general goal to protect ecological populations. Footnote “d” states the remedy enhances overall ecological protection to populations in the Melton Valley watershed but also notes that portions of the valley not addressed by the current remedies may still represent unacceptable risk to ecological receptors. To date, that vast majority of biological sampling focuses heavily, perhaps entirely, on aquatic receptors only, but large portions of the Melton Valley watershed include habitat areas that also support terrestrial ecological receptors. TDEC understands that final RODs will address ecology as a whole in the future. What comprehensive ecological data is being collected to support evaluating impacts from future remedies?

6. **Pages 2-41, Table 2.13 and Page 2-52, Table 2.14**

As described in Section 1.5 of this document, text within the performance monitoring discussion acknowledges the following groundwater expectations on page 1-13. Please be consistent in using these groundwater expectations when evaluating data even if only as a screening evaluation not defined in the IROD. Screening or comparing concentrations against industrial PRGs for groundwater as shown in these summary tables is potentially misleading. Please correct tables to reflect groundwater screening expectations as appropriate.

7. **Pages 2-52 through 2-54, Table 2.14**

Table 2.14 shows a summary of 10-year and 5-year groundwater contaminant trends with a significant amount of water quality concentrations identified at individual wells with concentrations above MCLs. The trends in these wells largely show no trend or downward trends, with some trending upward. Please note that when evaluated for individual wells and without the additional parameters to evaluate plume composition, natural attenuation mechanisms, and groundwater flow speed and direction, these trends may simply be showing plume migration or movement as groundwater flows past that well point. Please revise the text to include these points.

8. **Pages 2-52, Table 2.14**

While the ROD for Interim Actions in the Melton Valley Watershed (MV IROD) (DOE/OR/01-1826&D3) did not specify ARAR-based groundwater remediation levels and meeting ARAR-based levels is not a performance objective of the ROD (with MCLs and radiological risk-based contaminant concentrations used only as comparative metrics in the discussions), the MV Interim ROD does list for waste management areas (WMAs), including SWSAs 4, 5, and 6, and Seepage Pits and Trenches, the RAO goals related to groundwater “manage waste disposal areas as a restricted waste management area” and “mitigate further impact to groundwater”. The implied potential movement of the plume with MCL exceedances at various monitoring well locations would suggest that there may be further impacts to groundwater occurring at these

sites. To meet this RAO additional assessment would be required, such as further delineation of groundwater plumes within and surrounding these areas.

9. **Pages 2-55 through 2-56**

Similar to the trend discussion above in Specific Comment #3, the degradation products associated with TCE in the wells around SWSA-6 that show stable continued impacts or in some instances increasing trends are only being evaluated on an individual well basis. Performing this evaluation on individual wells without information on groundwater conditions such as plume composition, natural attenuation mechanisms, and groundwater flow speed and direction may simply be showing plume migration or movement as groundwater flows past that individual well. Furthermore, as stated in the text "the trend evaluations and maximum detected concentrations for constituents exceeding the MCLs or MCL-DCs summarized in Table 2.15 show that, consistent with the data shown on Figures 2.12 and 2.13, carbon tetrachloride and TCE [trichloroethene] exhibit gradually increasing concentration trends." This assessment from page 2-56 suggests that the goal to "mitigate further impacts to groundwater" is not being met. As concentrations increase, the impacts from the source continue to impact the subsurface and the plumes continue to expand without evidence of containment being effective. Please clarify that the RAO to "mitigate further impacts to groundwater" is not being met in this instance. To meet this RAO additional assessment would be required, such as further delineation of groundwater plumes within and surrounding these areas.

10. **Page 2-60, Table 2.16**

The tritium concentrations around the Tumulus waste disposal facility continue to show significant MCL exceedances. Mapping the plume around this area would be helpful to determine extent of impact. These data suggest the source is continuing to impact groundwater, and the RAO goal to mitigate further impact to groundwater is not being achieved. Please revise the text to discuss this finding.

11. **Page 2-66 to 2-68, Figures 2.16 through 2.18**

Presentation of the hydraulic head in cross-section in this manner is misleading without additional context. Please develop figures illustrating total dissolved solids (TDS) isocontour maps in cross section. Additionally, Figure 2.16 has "dissolved solids" in the legend that would be more appropriately named "total dissolved solids" with the appropriate units such as in the other two figures.

12. **Page 2-73, Table 2.18**

The Melton Valley offsite exit pathway wells summary report documents MCL or MCL-DCs exceedances for alpha activity, arsenic, barium, fluoride, lead, and total radium alpha. While the majority of the trend analysis shows no trend or stable results, the fact that the constituents remain above regulatory levels can imply that the source continues feeding this groundwater contamination zone. Without further evaluation of groundwater movement, flow direction, background concentrations or plume delineation, the consistent MCL exceedances at these wells are concerning. The implication for exceedance trends at a boundary/offsite well is that groundwater contamination exists, and the goal to mitigate further impact to groundwater may not have occurred simply through the use of these IROD techniques. Please provide additional discussion of these exceedances.

13. Page 2-75, second paragraph

Sr-90 is a known contaminant of concern in Melton Branch, but the fish collected from Melton Branch kilometer (MEK) 0.2 were not analyzed for Sr-90. Only fillets are analyzed at this site, but it would be beneficial to have baseline data from whole-body tissue analysis of Sr-90 to address eco-risk in future RODs. Since eco-risk is more likely a concern at sites in Melton Branch, should analysis be performed on whole-body fish instead of fillets?

14. Page 2-76, second paragraph

The second to last sentence says “(data not shown)” for the number of sensitive darter species increasing. Please include a reference where to find these data.

15. Page 2-78, second paragraph, third sentence and third paragraph, second sentence

There are two sentences that suggest there's been improvement of EPT species richness at White Oak Creek kilometer (WCK) 2.3 in 2025. In 2025, WCK 2.5 was sampled, not WCK 2.3. There most likely hasn't been an improvement at WCK 2.3, but a decrease in EPT due to the lack of habitat availability. Please revise these two sentences.

16. Page 2-90, Table 2-21

The issue carried forward in this table since 2015 states that two wells did not meet the MV IROD goal for “groundwater level control inside a hydrologically isolated area.” This is the performance measure, not the RAO goal as defined in this document. The RAO goals listed for the WMAs in the MV IROD include “manage waste disposal sites as a restricted waste management area” and “mitigate further impact to groundwater”. Generally, keeping the waste out of water through groundwater level control within the hydrologically isolated areas does work to mitigate further impact to groundwater, source materials that remain in groundwater continue to contribute to groundwater impacts. Since at least 2015, there have been impacts to groundwater due to source material in the groundwater. If the source is in the groundwater, then the goal to “manage waste disposal sites as a restricted WMA” would not be supported as meeting the WMA requirements in Tennessee (to keep waste out of water), and if the source remains in the water, this action is also potentially not mitigating further impacts to groundwater. As such, neither of the groundwater related goals for the IROD are met at this time. Please provide a path forward to manage this ongoing impact.

Section 3.0 ORNL – BV

17. Page 3-19, Table 3.4, Biota

The listed performance monitoring criteria for biota include aquatic biotic communities, but do not include any terrestrial monitoring. However, this listed RAO for the protection of ecological receptors includes terrestrial organisms (Table 3.2). Please clarify how terrestrial organisms are being monitored to complete this RAO, or how terrestrial organisms have been addressed previously to meet performance requirements.

18. Page 3-62, end of first paragraph

With changes to environmental structure (beaver dams) causing changes to environmental conditions (e.g., deeper pools), is there concern that the conditions are promoting increased potential for additional methylation of mercury (Hg) such that conditions similar to downstream reaches (White Oak Lake) are becoming more common in upstream reaches? Is removal of beaver dams being considered to maintain lower Hg methylation and bioaccumulation rates?

Section 4.0 Y-12 – BCV

19. Page 4-12, Table 4.3, Footnote e

Please change *ROD* to *Phase I ROD* for consistency with other citations in this section.

20. Page 4-18, Section 4.2.1.2.2, First Paragraph

Limits for cadmium and mercury are defined within the Bear Creek Valley Phase I ROD, however the text identifies mercury and cadmium as “site related metals” separately from “contaminants of concern.” Please provide additional language explaining the differences between “contaminants of concern” and “site related metals” within the context of the Bear Creek Valley Phase I ROD.

21. Page 4-36, Figure 4.9

In the legend, please clarify what the blue arrow indicates. Is it the flow direction of stormwater runoff, surface water, or groundwater?

22. Page 4-38, first paragraph (above Section 4.2.1.2.3)

Please expand the text to present hypotheses for the order-of-magnitude uranium flux increase between 2006 and 2010 and the order-of-magnitude decrease between 2013 and 2014.

23. Page 4-42, Figure 4.10

This figure shows uranium-238 concentrations in well GW-684 that appear to be increasing since 2013 and a significant spike in early 2025 where the uranium-238 concentration reached twice the RBC of 5.04 pCi/L. Please include a discussion of potential reasons why the uranium-238 concentration appears to be increasing and the potential causes of the spike shown in 2025.

24. Page 4-46, Section 4.2.1.2.4, Second Paragraph

The last sentence in this paragraph states “work is ongoing to identify the factors contributing to the elevated methylmercury concentrations and bioaccumulation in Bear Creek.” Please provide additional details on what work is being done and a schedule outlining when DOE is planning to share information regarding this work with TDEC.

25. Page 4-58, Section 4.2.1.2.4, Figure 4.24

As shown in Figure 4.24, while Bear Creek kilometer (BCK) 12.4 and NT-1 toxicity appears to be related to conductivity, that negative relationship doesn’t seem to be present when looking at BCK 9.9 alone. Please add discussion of other potential factors contributing to recently increasing toxicity at BCK 9.9 described earlier in this section.

26. Page 4-61, Table 4.21, Footnote f; Page 4-65, Section 4.3.2.1; and Page 3-71, Table 3.16, Footnote f)

Expand the text to clarify what is meant by *DOE proprietary control(s)*.

27. Page 4-64, Section 4.3.1, First Paragraph

To be consistent with the language in the Bear Creek Valley Operable Unit 2 ROD, please revise the second sentence in this paragraph to clarify that the purpose of this ROD was to “ensure that human health and the environment are protected from exposure to contaminants.”

28. **Page 4-65, Section 4.3.1.2, Last Paragraph**

The first sentence states that the SY-200 Yard area may be used for “parking or waste equipment staging to support waste handling activities”, but the second sentence states that the area may be used for the “staging of waste”. Please revise the language to clearly state whether the area is planned to be used for the staging of equipment to support waste handling or the staging of waste.

Section 5.0 Y-12 – UEFPC

29. **Page 5-12, Table 5.2**

Performance standards listed for biological trend sampling include annual invertebrate, spider, and stoneroller minnow sampling for metals including mercury/methylmercury, polychlorinated biphenyl (PCBs), and lipids at East Fork Poplar Creek kilometer (EFK) 6.3 and EFK 23.4; and annual invertebrate sampling for the same list of analytes at EFK 24.4 (year before the FYR [Five-Year Review]). Please clarify if this sampling at EFK 6.3 and EFK 23.4 is also only completed the year before the FYR or if that timeline is specific for invertebrate sampling at EFK 24.4. If invertebrate and spider sampling for metals and PCBs is conducted annually independent of the FYR, please provide the associated data in this report.

30. **Page 5-18, second paragraph**

Bypass flow occurred at Big Springs Water Treatment System (BSWTS) two times during this RER period, with flows measuring “18,018 gallons” and “7,617 gallons”. Please provide additional clarification as to why the volume of both was insufficient for a sample. For comparison, the 2025 RER (*DOE/OR/01-2989&D2*) includes samples taken when the measured flows were 9,328 and 5,901 gallons.

31. **Page 5-18, third paragraph**

Page 5-17 of this RER states “At Outfall 51, flow rate is monitored continuously...”. However, the second sentence of this paragraph references “Weekly instantaneous flow measurements...”. Does the equation (14 days / 52 visits x 365 days = 98 days) only consider a “day” of flow (i.e., 14 days) when a sample is also taken? If flow rate is monitored continuously, it seems there should be data available to determine the number of days where there is active flow through Outfall 51. Please clarify how the variables in this equation are determined.

32. **Page 5-18, Table 5.3**

The paragraph above this table references “quarterly sampling of VOCs in effluent and influent...”. However, the table only presents *INFLUENT* VOC data. Were the maximum effluent results all non-detect? Please explain why there is no effluent data listed in the table for VOCs.

Section 6.0 Y-12 – Chestnut Ridge

33. **Page 6-25, second paragraph**

The third sentence in this paragraph references mercury concentrations in clams at two downstream Melton Branch sites. Should this sentence be referencing McCoy Branch instead?

Section 7.0 – ETPP

34. **Page 7-61, Section 7.6.2.2, last paragraph**

Please consider testing coontail for PCBs as a source of potential ecological risk since it is a food source for waterfowl in the K-1007-P1 Holding Pond.

35. **Page 7-95, Section 7.7.2.2 and page 7-97, Section 7.7.3**

Considering mercury regularly exceeded AWQC water quality criteria in Outfall 180 and PCB concentrations in caged clams downstream of SD-190 remain elevated, please discuss DOE plans to address the sources of contamination in Mitchell Branch and how they relate to the ongoing storm drain closure activities.

36. **Page 7-101, Section 7.7.3**

While interannual variability is a viable explanation for fluctuations in total taxa richness and EPT richness in Mitchell Branch, all benthic macroinvertebrate sampling sites showed marked decreases for both metrics in 2025 compared to 2024 values. Please discuss any potential negative impacts to the benthic macroinvertebrate communities resulting from contaminated soil remedial activities along Mitchell Branch over the past two years.

Section 8.0 – Other Administrative Watershed Areas

37. **Page 8-7, last sentence**

This sentence states that the parking lot eliminates an exposure pathway for any soil contamination but doesn't specify the type of exposure pathway it's eliminating. Please revise the statement to accurately describe which exposure pathway was eliminated.

Appendix A: Certification of Land Use Control Implementation

No Comments

Appendix B: Selected ORNL Groundwater Data

No Comments

Appendix C: Building D&D

38. **Page C-9, Section C.2.4.3**

This states that the site underwent an annual inspection in FY 2025 to ensure PCB postings are in place. The site is currently posted as an Underground Radioactive Material Area. Please revise the statement to refer to radiological postings instead of PCB postings.

Appendix D: Offsite Detection Monitoring

39. **Appendix D – Table D.1**

The analytical results from SYN-120 include, and has historically included, detectable concentrations of bromodichloroethane, chloroform, and dibromochloromethane. Results of TDEC co-sampling of this well confirm these detections. Please revise the text to include a discussion on the source of these contaminants.

Questions or comments concerning the contents of this letter should be directed to Eileen Marcillo by phone at (865) 985-2397 or by email at eileen.marcillo@tn.gov.

Sincerely

Eileen Marcillo Digitally signed by Eileen Marcillo
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