



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



June 3, 2026

Mr. Roger Petrie
Oak Ridge Office of Environmental Management
U.S. Department of Energy
Post Office Box 4067
Oak Ridge, Tennessee 37831

Dear Mr. Petrie

RE: Addendum to the Zone 1 Groundwater Plumes Remedial Investigation Work Plan for Exit Pathway Monitoring, East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2903&D2/A3)

The Tennessee Department of Environment and Conservation (TDEC), Division of Land Protection – Remediation Branch, Oak Ridge Environmental Field Office, received the U.S. Department of Energy (DOE) letter transmitting the above referenced document on March 9, 2026.

While the exit-pathway work proposed in this Zone 1 (Z1) Remedial Investigation Work Plan (RIWP) addendum may be beneficial to the overall ETTP groundwater investigation, the effort and money associated with this project may be better utilized, at this time, to accelerate implementation of the alternatives approved in the East Tennessee Technology Park (ETTP) Main Plant Interim Record of Decision (IROD) (DOE-OR-01-2949&D1). Redevelopment at ETTP is occurring rapidly, even outpacing planned and approved groundwater remediation efforts (e.g., Radiant in the K-27 area). Money and effort spent on this particular exit-pathway project may be better utilized to help expedite Main Plant groundwater source reduction before reindustrialization makes it difficult to access groundwater plumes and potentially more costly to implement approved alternatives. DOE has made commitments through the ETTP Main Plant Interim Record of Decision (IROD) (DOE-OR-01-2949&D1) to substantially reduce contaminant mass of 6 chlorinated volatile organic compound (CVOC) source areas. TDEC encourages DOE to prioritize this effort and accelerate implementation of the selected alternative to reduce groundwater CVOC contamination. This will in turn help to reduce the vapor intrusion pathways risk to incoming developers. Despite the rapid reindustrialization of ETTP, DOE is still expected to “return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable” 40 CFR § 300.430(a)(1)(iii)(F).

While TDEC believes DOE resources and efforts could be better utilized at this time by accelerating implementation of Main Plant IROD commitments, the State has reviewed the above referenced document pursuant to Section XXX of the Federal Facility Agreement (FFA) for the Oak Ridge Reservation and provides the enclosed comments.

Review of this request meets the FFA review cycle protocol of 90 days. Questions or comments concerning the contents of this letter should be directed to Jared Brabazon at the above address, or by phone at (865) 201-2407.

Sincerely

Eileen Marcillo

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Date: 2026.06.01 15:17:05 -04'00'

Eileen Marcillo
FFA Project Manager
Division of Land Protection – Remediation Branch
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GENERAL COMMENTS

Comment 1: Please note that while the State supports the scope of this work to install exit-pathway wells, the installation of these wells should not be considered a required precursor to future groundwater decisions. This particular work, and any potential delays associated with this work, should not inhibit or prevent other ETTP groundwater cleanup efforts from moving forward. Is this work directly tied to CERCLA or to DOE orders?

Comment 2: Property boundaries, in and of themselves, are not delineation markers that determine where cleanup efforts for groundwater may or may not be required. Exit-pathway wells will be useful to determine point-in-time risk and site conditions at the boundary where these wells are located and can provide information about what may be moving offsite at those specific areas. However, these wells do not alleviate the requirement to delineate or manage the plumes that exist onsite.

As addressed in prior letters and documents:

- The State reiterates a full delineation (horizontal and vertical extent) of all groundwater plumes should occur at the site.
- The groundwater at the ORR is identified in accordance with TDEC Rule 0400-40-03 as General Use Groundwater and applies for all groundwater.
- The State expects source treatment will follow regulatory agreements in decision documents, and water quality compliance is expected within the plume.

Comment 3: Please provide context and DOE's reasoning to prioritize this project ahead of other possible ETTP groundwater cleanup efforts.

Comment 4: As part of the Z1 GW RI work, groundwater wells were unable to be installed near the presumed toe of the K-1070-A plume due to overhead powerlines. The toe of the plume is mostly undefined, with monitoring primarily being performed at a seasonal spring, 21-002. The 1996 dye tracer study suggested that some of the migration from this plume entered the K-901-A holding pond. However, deeper potential pathways seem to be unknown. While the selection of location ETTP-EP-Area-01 is attempting to identify these deeper pathways, TDEC is concerned with the distance of ETTP-EP-Area-01 relative to the ETTP boundary. In addition, the listed justifications for choosing this location also appear to have relatively high uncertainty. As mentioned on page 2-1, Area-01 is said to be potentially linked to the K-1070-A plume by a low concentration dye detection in Brashear's creek during the 1996 dye tracer study. However, as mentioned on page 3-7, this particular location along Brashear's Creek would require the K-1070-A plume to cross multiple geologic formation boundaries. While this may not be impossible in karst conditions, it seems potentially unlikely. Although the tracer dye was detected at this location, no known contaminants related to K-1070-A have been detected within the stream. Similarly, nearby residential well Syn-164, west of Brashear's Creek, has not yielded any detections of known K-1070A contaminants in groundwater. Page 3-7 also identifies that this low concentration dye could also be potentially attributed to common household products. Overall, the justification for choosing this location seems to be quite uncertain. TDEC recommends re-evaluating this location or providing more evidence to justify the chosen location.

Comment 5: Building on general comment 4, please provide the following additional details regarding predominant flow pathways for K-1070-A contamination:

- 1) As drawn in other ETTP documents, the K-1070-A plume appears to be primarily in the Longview Dolomite and the Kingsport Formation of the Knox Group. Please provide information clarifying whether this proposed exit pathway Area-01 will properly capture the likely flow pathways for this plume based on known wells and/or from the regional/inset model.
- 2) Please provide information regarding other potential pathways for the K-1070-A plume. While the dye trace identified the K-901-A pond as a pathway, are there any other known deeper pathways that have been identified by the regional model or through observed data closer to the ETTP?
- 3) Please discuss the pros and cons either in the document or with the project team of potentially moving this proposed exit pathway location closer to ETTP boundaries. If the dye trace is the driving factor, would it be possible to move the site closer while still screening the geologic units connected with the historical dye trace? Is it possible or cost effective to perform another dye tracer study to confirm or identify other potential locations?

Comment 6: DOE drilled several deep multi-zone wells near SWSA-3 on the Oak Ridge National Laboratory (ORNL). As part of this process, DOE met with TDEC and the U.S. Environmental Protection Agency (EPA) to discuss the drilling and geophysical logs and present the screened intervals selected for well construction. TDEC found these meetings very informative and helpful at ORNL and requests DOE hold similar meetings for these exit pathway wells at ETTP.

Comment 7: This report identifies the use of Westbay multi-port wells. Westbay is no longer operational. Please remove reference to Westbay and update the report globally with the intended technology or approach that will be used to target multiple geologic formations and/or zones during well construction.

Comment 8: This workplan references United Cleanup Oak Ridge LLC (UCOR) documents or UCOR specific standard operating procedures (SOPs) that are not publicly available for review by the State. Any relevant information needed to describe the work should be provided within the CERCLA document in some way. Please either address the relevant information in the text of the CERCLA document or alternately provide the procedures as appendices where appropriate. A similar concern was recently identified and resolved in the Remedial Design Work Plan for the ETTP Main Plant Area Groundwater IROD (DOE/OR/01-3005&D2). TDEC recommends following that same approach for this document.

SPECIFIC COMMENTS

Comment 1: Page ES-1 Executive Summary

The final 2 sentences in the Executive Summary do not appear to be reflective of agreements made by the tri-parties. Those sentences read: "Through development of the DQO and FSP, this project was identified as a precursor to future groundwater decisions for ETTP. Information collected from this project and effectiveness of onsite containment source control will inform any future exit pathway

monitoring needs as well as any relevant future ETTP groundwater projects.” TDEC recommends deleting these sentences.

While these wells may influence future projects if the exit pathway wells were found to be contaminated (thus indicating a critical event where contamination is identified to be leaving the site in ways that will impact the public directly with a critical time factor in play), it is key to note that the State expects cleanup to be in accordance with State of TN Rules, the National Contingency Plan (NCP), Resource Conservation and Recovery Act (RCRA) and CERCLA federal guidance. ARARs associated with these rules and regulations are the drivers for future groundwater decisions across this site, regardless of the findings within these wells.

Comment 2: Page 1-1, First Paragraph, Fourth sentence

At the end of the sentence, please remove the words “if any”.

Comment 3: Page 1-6, Bulleted list on ETTP Groundwater Model

This section notes that particle tracking was utilized to identify and further understand the groundwater pathways at the four proposed locations. In the attached DQO slides, reverse particle tracking is only presented for Area-02 and Area-04. Were models/particle tracks also used to identify potential pathways for Area-01 and Area-03? Please provide additional information (e.g., figures, text) that show the approach used to confirm that these proposed locations have a high likelihood of intersecting ETTP migration pathways at all four proposed locations.

Comment 4: Page 2-1, Last sentence of last paragraph

Please elaborate either here or in Chapter 3 on what geologic formation was identified to discharge to Brashear’s Creek (e.g., Chepultepec Dolomite, Copper Ridge Dolomite). Please include text on any known history of springs and/or karst features within the geologic formation connected to the dye discharge.

Comment 5: Page 2-4, Section 2.1.2, ETTP-EP-Area-02, bottom of first paragraph

This section lists several wells that are already located within the proposed ETTP-EP-Area-02. Existing wells BRW-034, BRW-035, UNW-065, UNW-066 in the proposed area have screen midpoints at approximately 109.4 feet (ft) below ground surface (bgs), 39.9 ft bgs, 13.25 ft bgs, 12.8 ft bgs, respectively (Groundwater Modeling Progress Report UCOR-5580). While TDEC understands that BRW-035 and UNW-066 are briefly discussed in Section 3.3.3 (page 3-18 and 3-19), please provide further details on what data gaps the exit pathway well will provide information on that these existing wells do not already achieve.

Comment 6: Page 3-5, Bulleted list and paragraph after bullets

These bullets identify contaminants for each source area. However, the list of contaminants appears to be limited. While historical contaminants may not be as prevalent in current sampling events, it is important to continue sampling these contaminants, especially at exit pathway locations, as they may have migrated to deeper or more distal locations over time. Please revise the bulleted list on page 3-5 to capture all contaminants, both current and historical.

The following contaminants, at least according to a recent datapull from OREIS, have been detected and have exceeded respective maximum contaminant levels (MCLs) between 1990-2026 across ETTP. At a minimum, all of these contaminants should be considered for sampling, at least initially.

Parameter Name

- | | |
|--------------------------|------------------------------------|
| • 1,1-Dichloroethene | • Copper |
| • 1,1,1-Trichloroethane | • Ethylbenzene |
| • 1,1,2-Trichloroethane | • Fluoride |
| • 1,2-Dichloroethane | • Lead |
| • 1,2-Dichloropropane | • Mercury |
| • 1,2,4-Trichlorobenzene | • Nickel |
| • 2,4-D | • Pentachlorophenol |
| • Alpha activity | • Perfluorooctanesulfonate (PFOS) |
| • Antimony | • Perfluorooctanoic acid (PFOA) |
| • Arsenic | • Polychlorinated biphenyls (PCBs) |
| • Barium | • Radium-226 |
| • Benzene | • Selenium |
| • Benzo(a)pyrene | • Simazine |
| • Beryllium | • Tetrachloroethene |
| • Beta activity | • Thallium |
| • Cadmium | • Toluene |
| • Carbon tetrachloride | • Total Uranium |
| • Chlorobenzene | • trans-1,2-Dichloroethene |
| • Chromium | • Trichloroethene |
| • Chromium, hexavalent | • Uranium |
| • cis-1,2-Dichloroethene | • Vinyl chloride |

Comment 7: Page 3-9, K-1085 Old Firehouse Burn Area

Please update this section with recent K-1085 maps/data where possible and pertinent, especially where new information may change the conceptual site model (CSM) for this proposed area.

Comment 8: Page 4-1, Step 1 and Step 2

TDEC strongly urges that the CSM, updated potentiometric surfaces, and groundwater modeling be used to guide the location of the exit pathway wells. This step should not be a secondary action but should rather be the primary driver in well location selection. As written, the first data quality objective (DQO) step is to drill exit pathway wells at four locations surrounding ETTP. Then, flow pathways will be evaluated to identify links to ETTP only if contaminants are identified that exceed risk levels in those areas. As mentioned in general comment #4, evaluations of flow pathways via CSM and groundwater modeling are needed upfront to ensure the chosen location of the exit pathway wells have a high likelihood of intercepting potential hydrogeological pathways connected to ETTP. Similar to specific comment #4, please include discussions of any modeling or approaches used to bolster the decision of these particular locations within DQO Step 1. TDEC encourages early identification of

areas/depths/intervals that are strongly connected to ETPP via the CSM and groundwater modeling upfront, before location selection.

Comment 9: Page 4-2, Table 4.1. DQO Step 3: Identify information inputs

The third column of this table identifies additional information needs regarding “Regulatory and risk-based screening levels identified for ETPP CERCLA activities.” What additional information is needed regarding these screening levels? Please refer to section 5.1.1 of the approved Zone 1 Groundwater Remedial Investigation Workplan (DOE/OR/01-2903&D2).

Comment 10: Page 4-3, 4.1.4 Data Quality Objectives Step 4: Define the Study Boundary, 3rd bullet, Temporal boundaries

This paragraph suggests “quarterly sampling will be conducted for 1 year.” Please note the boundaries of the existing plumes on the reservation are not delineated for vertical or horizontal extent. There remain significant unknowns with respect to groundwater flow and contaminant migration. Until delineation at the edge of contamination is complete and site conditions have been further evaluated, the “exit pathway”/sentinel wells should be sampled regularly.

Comment 11: Page 4-3, Step 5: Develop Decision Rules

Please rewrite the if/then statement to be:

“Data evaluation and future action considerations will include, but not be limited to, concentrations of ETPP contaminants that exceed State and/or Federal MCLs or exceed the upper CERCLA risk range of 10^{-4} .”

Section 5.1.1 of the approved Zone 1 Groundwater Remedial Investigation Workplan (DOE/OR/01-2903&D2) identifies potential ARARs for ETPP Z1 groundwater. At a minimum, the if/then trigger should be in line with these ARARs. In addition, any exceedance of regulatory or risk levels should warrant further data evaluation or consideration, not just those contaminants that exceed in all four quarters.

Comment 12: Page 4-6, Figure 4.3

Figure 4.3 in the document depicts the Area-01 well to be sited within the Copper Ridge Dolomite. Is this the intended formation over which to screen the exit pathway well? If so, is the Copper Ridge Dolomite the formation that discharged dye to Brashear’s Creek?

Comment 13: Page 4-10, First paragraph of the page

This paragraph states that “regulatory limits, including ARARs, and risk-based screening levels are yet to be determined for groundwater” and that “these limits will not be available for the foreseeable future.” The text also states that “These [ARARs] will be established in future ETPP groundwater decisions.”

The approved Zone 1 Groundwater Remedial Investigation Workplan (DOE/OR/01-2903&D2), specifically section 5.1.1, clearly identifies potential chemical-specific and location-specific ARARs and to be considered (TBC) guidance for ETPP Z1 groundwater. Please ensure all sampling approaches and methods for this workplan will provide useful results that can be meaningfully compared to these ARARs.

In addition, tri-party discussions have been ongoing for many years, ultimately culminating in the first signed groundwater ROD at ETTP, specifically for the K-31/K-33 Area (DOE/OR/01-2950&D2). The K-31/33 Groundwater ROD has clearly established final groundwater ARARs agreed upon by the tri-parties. Similar to K-31/K-33, the State expects ETTP groundwater "Shall not contain constituents that exceed those levels specified in subparagraphs (1)(j) and (k) of Rule 0400-40-03-.03; and shall contain no other constituents at levels and conditions which pose an unreasonable risk to the public health or the environment.

Comment 14: Page 4-21, Figure 4.18

This figure identifies overhead powerlines in the ETTP-EP-Area-03. Please provide text describing whether these powerlines will inhibit the ability of installing well(s) in this proposed area.

Comment 15: Page 4-23, 4.3.1 Borehole Drilling for Proposed Wells

This section notes borings will proceed to a maximum depth of approximately 400 ft bgs. Please add text clarifying the reasoning for using 400 ft bgs as a predefined cutoff.

Comment 16: Page 4-26, 4.6 Risk Assessment Methodology

What is the purpose of this risk assessment solely at the ORR and Clinch River boundary? While a risk assessment solely at the ORR and Clinch River boundary may be of some benefit, it does not remove the need for onsite cleanup. To be consistent with CERCLA/NCP, it is expected that DOE "return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable." 40 CFR § 300.430(a)(1)(iii)(F). If no contamination or risk is identified in the exit pathway wells, TDEC still expects the groundwater at ETTP to be returned to beneficial use wherever practicable. The water at this site is currently classified by the State of Tennessee as "General Use Groundwater" 0400-40-03-.07 and as such the criteria defined in 0400-40-03-.08 should be addressed. This includes that groundwater "Shall not contain constituents that exceed those levels specified in subparagraphs (1)(j) and (k) of Rule 0400-40-03-.03; and shall contain no other constituents at levels and conditions which pose an unreasonable risk to the public health or the environment."

Comment 17: Page B-26, B.4.2.2 Borehole Geological Logging

Please provide additional details regarding how field screening for volatile organic compounds (VOCs) or radionuclides will be conducted. Table B.4.2 mentions that photoionization detector (PID) readings will be recorded. A review of the referenced Quality Assurance Project Plan QAPP (UCOR-4049) does not show a specific procedure for collection of these field measurements. Table 3 of the QAPP states that a PID or flame ionization detector (FID) will be used for VOC sample screening and for health and safety screening. TDEC recommends that, at a minimum, PID readings from the cores be collected at least every 5 ft using some method to shield the core, or aliquot thereof, from interferences of the surrounding environment (air, wind, exhaust, etc.). Please clarify if DOE plans to use ColorTec for providing field measurements of specific VOCs. As these wells are intended to evaluate the geology and potential impacts from site chemicals, specifically VOCs, these cost-effective methods can aid in design of the proposed well as well as provide invaluable data for potential future investigations. Please provide additional descriptions for these methods within the text.

Comment 18: Page B-34 to B-38, Table B.5.2

Please include PFOS/PFOA to the analyte list on Table B.5.2 utilizing EPA method 1633A.

Comment 19: Page B-34 to B-38, Table B.5.2

Table B.5.2 identifies a *Reporting Limit* to be used for all analytes. These wells will serve as exit pathway wells/sentinel wells. Please confirm whether the reporting limit is tied to the minimum detection limit for these constituents. Lower levels of constituents are relevant as indicators that plume concentrations may be migrating. As plumes are not fully defined onsite and a full understanding of contaminant transport may not fully be known, any detection, even if below MCLs, can help serve as an early warning of potential offsite migration.

Comment 20: Page B-41, B.6. Investigation-Derived Waste Management

The project team worked to resolve comments regarding investigation derived waste (IDW) management in the recent Remedial Design Work Plan for the Main Plant Area Groundwater IROD (DOE/OR/01-3005&D1). As requested in that document, TDEC again requests that the definition of where and how IDW will be managed for this project be outlined within CERCLA documentation, rather than requiring the permit holders to have those details in their permits. Please include CERCLA waste management info related to this work in this document or identify which CERCLA document it will be provided in.

Comment 21: Page B-43, B.7 Reports, last paragraph

Please update this paragraph from conditional statements to more definitive statements. As written, it shows that status update presentations to EPA and TDEC “may be” made prior to the RI report. TDEC requests that these presentations be provided to the tri-parties, especially in the when pertaining to potential modifications to further sampling.

