REGION 4
ATLANTA, GA 30303

August 25, 2026

ENVIRONMENTAL COMPLIANCE &

AUG 25 2026

AREA COMPLETION PROJECTS

Mr. Matthew Baker, SRS Remedial Project Manager
Remediation and Deactivation & Decommissioning Division
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

EPA Comments: EFFECTIVENESS MONITORING REPORT (EMR) FOR THE P-AREA GROUNDWATER (PAGW) OPERABLE UNIT (OU) ZERO VALENT IRON PERMEABLE REACTIVE BARRIER (ZVI-PRB) REMOVAL ACTION (U) APRIL 2024 THROUGH MARCH 2025, SEMS NUMBER: 81, SRNS-RP-2026-00168 REVISION 0, APRIL 2026 SAVANNAH RIVER SITE AIKEN, SOUTH CAROLINA

Dear Mr. Baker,

The U.S. Environmental Protection Agency, Region 4 (EPA), has reviewed the EMR for the PAGW ZVI-PRB RA for April 2024 through March 2025. Our comments are attached.

If you have any questions or require additional information, please contact me at (404) 431-1340.

Sincerely,

JON RICHARDS
Digitally signed by JON RICHARDS
Date: 2026.08.25 09:44:34 -04'00'

Jon Richards
FFA Remedial Project Manager
Superfund & Emergency Management Division

ec: C.L. Bergren, SRNS-ACP
Susan Fulmer, SCDES

GENERAL COMMENTS

1. The EMR proposes to continue monitoring of the zero-valent iron (ZVI) permeable reactive barrier (PRB) as part of the P-Area Groundwater (PAGW) Operable Unit (OU) long-term monitoring, but it is unclear if additional characterization is warranted within the southern ZVI-PRB neck area to ensure groundwater is flowing through the barrier. Monitoring well PIW003D is located within the southern half of the ZVI-PRB and continues to have detections of trichloroethylene (TCE) above the maximum contaminant level (MCL) of 5 micrograms per liter (µg/L), including the most recent detection of 5.91 µg/L in the first quarter 2025 (1Q25). Two wells located immediately downgradient of the ZVI-PRB in this area (PRW004DL and PRW004DU) have had variable TCE trends, with increasing TCE concentrations observed from fourth quarter 2022 (2Q22) to the present in well PRW004DL (see Figure 12, Time-Series Plot for TCE at UAZ [Upper Aquifer Zone] Monitoring Well Clusters for P002U, PRW002 and PRW004). The EMR indicates that the elevated and rebounding concentrations observed at the PRW004 well cluster are likely due to back diffusion from low-permeability sediments downgradient of the ZVI-PRB, however, it is also possible that slow groundwater velocities or preferential flow paths may be contributing to incomplete treatment or localized bypass of the ZVI-PRB. As shown on Figure 10 (UAZ Water Elevations for 1Q25 at PAGW OU RA EMP Monitoring Wells), the groundwater elevations in the wells surrounding the ZVI-PRB are similar (i.e., 274.39 ft in downgradient well PRW004DU and 273.99 ft in the in-wall well PIW003D), while Figure 9 (Regional UAZ Groundwater Elevations and Flow Direction [1Q25]) shows an area of relatively flat groundwater levels suggesting localized flow reversals could be possible. Therefore, the direction of groundwater flow in the vicinity of PIW003D is unclear and there is a potential data gap directly west of PIW003D. Additional characterization actions, such as conducting tracer tests to confirm flow paths or installation of an additional monitoring well on the southern side of the ZVI-PRB (i.e., west of PIW003D), could be performed to verify ZVI-PRB performance. **Please revise the EMR to discuss whether additional characterization is needed to ensure the southern ZVI-PRB continues to treat groundwater and to verify the groundwater flow direction in the vicinity of PIW003D.**

2. The samples from the four in-wall wells (PIW001D, PIW002D, PIW003D and PIW004D) located within the ZVI-PRB were analyzed for calcium, sulfate, and nitrate, but it is unclear why well locations outside the ZVI-PRB (i.e., wells upgradient and downgradient) were not analyzed for these indicator ions. Section 2.4 (Removal Action Implementation and Monitoring Goals) states that decreasing nitrate concentrations downgradient can indicate passivation has occurred. In addition, this section states that sulfate and calcium ions in a reducing, high pH environment more readily precipitate, which could lead to a decrease in performance of the ZVI-PRB. As noted in Section 3.2.4 (Field Measurements), pH has remained elevated (i.e., 10.2 to 10.5) in the four in-wall wells. Also, Section 4.3 (ZVI-PRB Health and Longevity) states that some calcium precipitation is likely occurring based on upgradient results for calcium, but these results are not provided. Therefore, the indicator ions should be analyzed upgradient and downgradient of the ZVI-PRB in future monitoring events to evaluate whether these ions indicate passivation and precipitation are occurring as groundwater flows through the ZVI-PRB. **Please revise the EMR to indicate that indicator ions used to evaluate the health of the ZVI-PRB will be analyzed during upcoming monitoring events at monitoring locations upgradient and downgradient of the ZVI-PRB.**

3. The EMR indicates that the results were validated and several results were rejected based on exceedances of the hold time requirements, but it is unclear if there were any other qualifications or data usability issues as the data validation reports (DVRs) are not provided in the EMR. For example, Section 3.1 (Deviations from the Monitoring Plan) states that samples collected in August 2024 did not arrive at the laboratory within the temperature requirements, but information for any qualifications applied to these results is not provided. Based on the table in Appendix A (PAGW OU RA EMR Analytical Data 2024-2025), qualifications (e.g., "J" or "UJ") were not applied to the August 2024 results. Furthermore, the table in Appendix A indicates that "J" qualifiers for estimated quantities were applied to certain results, but the reasons for these qualifications are not discussed. In addition, it is unclear whether other data quality indicators (e.g., precision, accuracy, sensitivity, etc.) were evaluated. Please revise the EMR to include information for the results of the data validation, including the qualifiers applied to the results and the reasons for the qualifications. **Please also include the DVRs in the EMR.**

SPECIFIC COMMENTS

1. **Section 2.3, Nature and Extent of Contamination, Page 4 of 64; Figure 4, Trichloroethylene Plume Map for the Upper Aquifer Zone of the Upper Three Runs Aquifer (2018/2025 Data), Page 41 of 64; and Figure 5, Trichloroethylene Plume Map for the Lower Aquifer Zone of the Upper Three Runs Aquifer (2018/2025 Data), Page 42 of 64:** Section 2.3 indicates recent 2025 results from the PAGW OU Long-Term Monitoring were combined with results from 2018 for the distal areas on Figure 4 and 5 to define the TCE plumes, but it is unclear why more recent results are not available for the distal areas. Since the 2018 results are seven years older than the current results, it would be useful to indicate where the older results were used on Figures 4 and 5 to define where the extent of the TCE plumes may no longer be accurate. **Please revise Figures 4 and 5 to indicate where the 2018 data were used to define the extent of the TCE plumes and may no longer be accurate.**

2. **Section 3.2.2, Chlorinated Volatile Organic Compounds, Page 11 of 64:** The text states that the maximum detected result for trans-dichloroethylene (DCE) above the practical quantification limit (PQL) is 1.17 micrograms/liter (ug/L), but Appendix A, Table A (PAGW OU RA EMR Monitoring Well Data 2Q24-1Q25) lists well PRW004DL with trans-DCE detections of 1.6 ug/L in August 2024 and 1.3 ug/L in September 2024. **Please ensure Section 3.2.2 references the maximum result for trans-DCE detected above the PQL as presented in Appendix A.**

3. **Section 4.2, ZVI-PRB cVOC Degradation, Page 24 of 64:** The text states that TCE concentrations have decreased in UAZ monitoring well clusters west of the ZVI-PRB except at monitoring wells PRW004DL and PRW007DL; but the trend at well PRW007DL is not discussed. Based on Figure 13 (Time-Series Plot for TCE at UAZ Monitoring Well Clusters for PRW005, PRW006, and PRW007), TCE concentrations have remained relatively stable with a possible increasing trend in recent years. **Please revise the text to discuss the TCE concentrations in well PRW007DL.**

4. **Section 4.2, ZVI-PRB cVOC Degradation, Page 24 of 64:** The TCE concentrations in well PRW004DL are stated to have initially decreased following ZVI-PRB installation to non-detection in 2Q20, then increased to 72.5 ug/L in 1Q22 and decreased to 3.10 ug/L in 1Q23, but this does not include the maximum and minimum concentrations shown on Figure 12 (Time-Series Plot for TCE at UAZ

Monitoring Well Clusters for P002U, PRW002, and PRW004). Based on Figure 12, TCE concentrations increased to approximately 120 ug/L in 4Q21 and then decreased to approximately 2 ug/L in 4Q22. **Please revise the discussion of the TCE concentrations in well PRW004DL to be consistent with the maximum and minimum results reported on Figure 12.**

5. **Section 5, Summary and Recommendations, Page 32 of 64:** The recommendation for including the monitoring of the ZVI-PRB in the PAGW OU long-term monitoring may indicate that a Quality Assurance Project Plan (QAPP) or QAPP Addendum will be prepared for the ongoing monitoring. The QAPP would include the proposed monitoring wells to be sampled, analyses, and decision statements for the evaluation of the health and performance of the ZVI-PRB over time. **Please revise this section to indicate if a QAPP or QAPP Addendum will be prepared for the continued monitoring of the ZVI-PRB.**

6. **Figure 7, Effectiveness Monitoring Plan Locations, Page 44 of 64:** It is unclear why this figure does not include all 26 monitoring wells in the PAGW OU non-time critical (NTC) removal action (RA) monitoring network. As listed in Section 2.5 (PAGW OU NTC RA Monitoring Network), background wells P003U and P003L and western monitoring well P002U are part of the monitoring well network but are not shown on Figure 7. **Please revise Figure 7 to include all 26 wells in the PAGW OU NTC RA monitoring network.**

7. **Appendix A, PAGW OU RA EMR Analytical Data 2023-2024, Pages A-3 to A-4 of A-4:** The table notes indicate that the yellow highlighted cells were, "Requested to be sampled but was not. See comments as to why not;" however, no comments providing explanations are included in the table. **Please include the comments as noted in the table or provide a reference to where this information can be found.**