



Department of Energy
 Savannah River Operations Office
 P.O. Box A
 Aiken, South Carolina 29802

NOV - 6 2024

Ms. Susan B. Fulmer, P. G., Manager
 Federal Remediation Section
 Division of Site Assessment, Remediation and Revitalization
 Bureau of Land and Waste Management
 South Carolina Department of Environmental Services
 2600 Bull Street
 Columbia, South Carolina 29201

Mr. Jon Richards
 Savannah River Site Remedial Project Manager
 Superfund and Emergency Management Division
 U. S. Environmental Protection Agency, Region 4
 61 Forsyth Street, SW
 Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Savannah River Site's Responses to the Regulatory Comments on the P-Area Groundwater (PAGW) Operable Unit (OU) Zero Valent Iron Permeable Reactive Barrier (ZVI-PRB) Removal Action (U) - April 2022 through March 2023 (SRNS-RP-2023-01281, Revision 0, March 2024), SEMS Number: 81

The U.S. Department of Energy (DOE) is submitting the subject comment responses for your review. The South Carolina Department of Environmental Services' (SCDES) and U.S. Environmental Protection Agency's (EPA) comments were received on August 8, 2024. This report will not be revised; however, all comment responses will be included in the next report, as applicable. Please review the enclosures and provide your approval within thirty (30) days from receipt. The effort and time that the EPA and the SCDES have provided on this operable unit are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-7805, or the DOE Operable Unit Manager, Mr. Philip Prater, at (803) 952-9333.

Sincerely,

AVERY HAMMETT
 Digitally signed by AVERY
 HAMMETT
 Date: 2024.11.06 09:51:22 -05'00'

Avery G. Hammett
 FFA Project Manager, DOE-Savannah River Operations Office
 Remediation, Deactivation, and Decommissioning Division

RDDD-25-106

Ms. Susan Fulmer
Mr. Jon Richards

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Enclosures:

1. SRS Responses to the South Carolina Department of Environmental Services' Comments on the P-Area Groundwater (PAGW) Operable Unit Zero Valent Iron Permeable Reactive Barrier (ZVI-PRB) Removal Action (U), April 2022 Through March 2023, SEMS Number: 81
2. SRS Responses to the U.S. Environmental Protection Agency's Comments on the P-Area Groundwater (PAGW) Operable Unit Zero Valent Iron Permeable Reactive Barrier (ZVI-PRB) Removal Action (U), April 2022 Through March 2023, SEMS Number: 81

cc w/o encl:

M. Reece, SCDES-Columbia
H. J. Porter, SCDES-Columbia
J. Blalock, SCDES-Columbia
S. French, SCDES-Columbia
G. R. Stewart, SCDES-Columbia
G. K. Taylor, SCDES-Columbia
T. R. Fuss, SCDES-Midlands Aiken Environmental Affairs Office
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E. G. Downing, SCDES-Midlands Aiken Environmental Affairs Office
H. L. Herlong, SCDES-Midlands Aiken Environmental Affairs Office

cc w/encl:

H. Cathcart, SCDES-Columbia
M. McRae, TechLaw, Inc.

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SPECIFIC COMMENTS

1. Section 2.4, Removal Action Implementation and Monitoring Goals, page 12. The last sentence of the first full paragraph on this page states that five annual EMRs will be submitted upon completion and implementation of the PRB and monitoring well network. It would be helpful for future EMRs to indicate which submittal they are numerically.

Response: Agree

This EMR is the third submittal and reports data from second quarter of 2022 to first quarter of 2023. Section 2.4 of future EMRs will be revised to include which submittal the current document represents.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

2. Table 2, Effectiveness Monitoring Plan Well Details, page 58. For future EMRs, please revise this table to include the role/location of each monitoring well (i.e., background, east/upgradient, in-wall, west/downgradient etc.).

Response: Agree

SRS agrees that the Effectiveness Monitoring Plan Well Details table would benefit from including the role/location for each monitoring well. This table will be revised in future EMRs similar to Table CR-1 included with these responses.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

3. Appendix C. Section 2.3 discusses discharges of TCE-contaminated groundwater above the MCL at surface water location SC-03. While surface water monitoring is not part of the monitoring plan addressed in this EMR, a time-series plot of TCE concentrations at SC-03 would be a useful and meaningful inclusion in this appendix for future EMRs.

Response: Agree with Clarification

The discussion of SC-03 in Section 2.3 is to provide context for the removal action, and results from that location can't be correlated to the effectiveness of the Zero-Valent Iron Permeable Reactive Barrier (ZVI-PRB) in the short term (5 years). This location is

ARF-024759

**SRS Responses to SCDES Comments on the Effectiveness Monitoring Report (EMR) for
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included as part of the P-Area Groundwater (PAGW) Operable Unit (OU) long-term monitoring network and a time-series plot for that location is provided in the biennial PAGW OU EMR.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

ARF-024759

**SRS Responses to SCDES Comments on the Effectiveness Monitoring Report (EMR) for
the P-Area Groundwater (PAGW) Operable Unit (OU) Zero Valent Iron Permeable
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Table CR-1. Revised Table of Effectiveness Monitoring Plan Well Details

Station ID	Role/ Location	EMP Analytes	Sampling Frequency	Aquifer Zone	UTM NAD27 Coordinates		Screen Interval [ft bgs]
					Northing	Easting	
PRW001DU	East/ Upgradient	1	Quarterly	UAZ	445596.3162	3676631.902	81.64 – 91.64
PRW001DL	East/ Upgradient	1	Quarterly	UAZ	445598.3731	3676629.427	109.78 – 119.67
PRW001C	East/ Upgradient	1	Quarterly	LAZ	445599.9071	3676626.031	146 – 156
PRW002DU	West/ Downgradient	1	Quarterly	UAZ	445585.9390	3676627.649	80.66 – 90.66
PRW002DL	West/ Downgradient	1	Quarterly	UAZ	445586.9572	3676624.563	107.21 – 117.21
PRW002C	West/ Downgradient	1	Quarterly	LAZ	445588.4929	3676621.475	148.06 – 158.06
PRW003DU	East/ Upgradient	1	Quarterly	UAZ	445611.1735	3676604.102	61.82 – 71.82
PRW003DL	East/ Upgradient	1	Quarterly	UAZ	445604.7647	3676615.225	94.85 – 104.85
PRW003C	East/ Upgradient	1	Quarterly	LAZ	445610.6833	3676609.033	136.58 – 146.58
PRW004DU	West/ Downgradient	1	Quarterly	UAZ	445597.7006	3676601.714	64.91 – 74.91
PRW004DL	West/ Downgradient	1	Quarterly	UAZ	445594.6377	3676609.430	111.45 – 121.45
PRW004C	West/ Downgradient	1	Quarterly	LAZ	445595.6558	3676606.345	144.38 – 154.38
PRW005DU	West/ Downgradient	1	Quarterly	UAZ	445590.1508	3676640.252	86 – 96
PRW005DL	West/ Downgradient	1	Quarterly	UAZ	445591.9763	3676642.705	108 – 118
PRW006DU	West/ Downgradient	1	Annually	UAZ	445558.1963	3676619.181	90 – 100
PRW006DL	West/ Downgradient	1	Annually	UAZ	445555.3423	3676617.965	120 – 130
PRW006C	West/ Downgradient	1	Annually	LAZ	445552.4918	3676617.365	160 – 170
PRW007DU	West/ Downgradient	1	Quarterly	UAZ	445591.1164	3676581.425	65 – 75
PRW007DL	West/ Downgradient	1	Quarterly	UAZ	445591.8774	3676578.649	100 – 110
P002U	West/ Downgradient	1	Quarterly	UAZ	445590.2617	3676613.766	87.5 – 92.5
P003U	Background	1	Quarterly	UAZ	445619.5780	3676625.921	84.3 – 89.3
P003L	Background	1	Quarterly	UAZ	445619.0672	3676627.156	113.6 – 118.6
PIW001D	In Wall	1, 2	Quarterly	UAZ	445593.7400	3676634.072	90 – 110
PIW002D	In Wall	1, 2	Quarterly	UAZ	445599.0687	3676614.949	85 – 105
PIW003D	In Wall	1, 2	Quarterly	UAZ	445600.2528	3676595.233	70 – 90
PIW004D	In Wall	1, 2	Quarterly	UAZ	445604.3150	3676581.044	60 – 80

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ft bgs – feet below ground surface

- 1 Volatile Organic Compounds: tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-DCE),
trans-1,2-dichloroethylene (trans-DCE), chloroethene (vinyl chloride [VC]), and 1,1-dichloroethylene (1,1-DCE)
- 2 Geochemical Analyses: Dissolved Organic Carbon (DOC), Total Organic Carbon (TOC), Total Dissolved Solids (TDS),
alkalinity, chloride, nitrate-nitrite as nitrogen, sulfate, sulfide, methane, ethane, ethylene, phosphate, calcium, iron,
ferrous iron (Fe^{2+}), ferric iron (Fe^{3+}), potassium, manganese, magnesium, sodium

GENERAL COMMENTS

1. The EMR does not state that verification and validation of the laboratory data occurred for this report. In addition, the EMR does not contain data qualifiers issued during the data validation process, data validation reports, discussion of the validated data or data validation procedures. *Please provide a discussion on the data validation process and include data validation reports, data qualifiers and validation procedures.*

Response: Agree with Clarification

Groundwater monitoring data reported for the P-Area Groundwater (PAGW) Zero-Valent Iron Permeable Reactive Barrier (ZVI-PRB) since 2019 have been Verified and Validated (V&V) level data. A summary of the regular sample data collected during the reporting period for each annual report is provided on Table A. Field duplicate groundwater samples have also been collected. For ease of reporting the data, data qualifiers are presented on the table as color-coded cells with an explanation provided at the bottom of the table.

All data collected in support of monitoring at the PAGW ZVI-PRB conform to the Savannah River Site *Area Completion Projects Quality Assurance Project Plan for Environmental Data Collection and Management* (ERD-AG-2005-00001). This document was developed in agreement with United States Environmental Protection Agency and South Carolina Department of Environmental Services to integrate all technical and quality aspects of environmental data collection and management to provide consistent data objectives and document the comprehensive set of standard operating procedures for sampling, analysis, quality assurance/quality control, and data review. Validation reports are typically not submitted with groundwater Effectiveness Monitoring Reports (EMRs). Additionally, the Environmental Compliance and Area Completion Projects organization has a series of administrative procedures (e.g., WSRC-C1, *Administrative Procedures*, ER-AP-125, *Soil and Groundwater Closure Projects Quality Assurance Program*) and technical memorandums that further define the requirements and responsibilities within EC&ACP for implementation of the quality program.

Data reported in the PAGW ZVI-PRB EMR were collected in accordance with the *Removal Action Design Plan (RADP) with Effectiveness Monitoring Plan (EMP) for the P-Area Groundwater (PAGW) Operable Unit (OU)* (SRNS-RP-2019-00105, July 2019). However, the EMP did not include details pertaining to data quality level for data to be collected. For clarification, the following paragraph will be added to future PAGW ZVI-PRB EMRs as introductory text in Section 3.0, *Monitoring Results and Deviations*, as follows:

“3.0 MONITORING RESULTS AND DEVIATIONS

Data reported in this EMR were collected in accordance with the *Removal Action Design Plan (RADP) with Effectiveness Monitoring Plan (EMP) for the P-Area Groundwater (PAGW) Operable Unit (OU)* (SRNS 2019). All data collected conform to the approved *Area Completion Projects Quality Assurance Project Plan for Environmental Data Collection and Management* (SRNS 2012b). Only groundwater data is collected in support of monitoring at the PAGW OU ZVI-PRB and is sent to SCDES certified laboratories for analyses. The data quality level for permanent groundwater monitoring well stations and field duplicate samples is Verified and Validated (V&V) level data (SRNS 2012a and SRNS 2012b).”

The following reference documents will be added to future PAGW ZVI-PRB EMRs.

“SRNS, 2012a. *Analytical Data Validation Report (U), Area Completion Projects Administrative Procedures Manual C1, ER-AP-303, Revision 4, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC.*

SRNS, 2012b. *Area Completion Projects Programmatic Quality Assurance Project Plan for Environmental Data Collection and Management, ERD-AG-2005-00001, Revision 5, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC.*

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

2. The EMR does not contain the reports issued by the laboratory for the analysis of the samples. *Please attach the laboratory data reports issued by the lab as an attachment.*

Response: Clarification

Please see response provided for General Comment 1.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

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3. The EMR does not discuss how the investigation derived waste (IDW) was managed during the sampling event. Due to the elevated level of groundwater contamination, *please provide text in the EMR that discusses how the IDW was collected, containerized, characterized and disposed.*

Response: Agree with Clarification

As discussed in the *Removal Action Design Plan (RADP) with Effectiveness Monitoring Plan (EMP) for the P-Area Groundwater (PAGW) Operable Unit (OU)* (SRNS 2019), any investigation derived waste (IDW) generated during sampling of groundwater monitoring wells is managed in accordance with the *SRS Investigation-Derived Waste Management Plan* (WSRC-RP-94-1227, November 2013). For clarity, the following text will be added to future PAGW EMRs as appropriate in Section 2.5 PAGW OU NTC RA Monitoring Network.

“All monitoring wells, with the exception of the PRW006 cluster, are scheduled to be sampled quarterly. The PRW006 well cluster is set farther west of the ZVI-PRB and will be sampled annually. Groundwater sampling activities associated with the ZVI-PRB may generate aqueous investigation-derived waste (IDW). Aqueous IDW may consist of decontamination rinses, well purge water, and sample residues. As discussed in the EMP, IDW generated during sampling activities will be managed in accordance with the SRS Investigation-Derived Waste Management Plan (WSRC 2013).”

In addition, the IDW plan will be added to the list of references in future EMRs as follows:

“WSRC, 2013. *SRS Investigative Derived Waste Management Plan*, WSRC-RP-94-1227, Revision 9, November 2013, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC.”

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

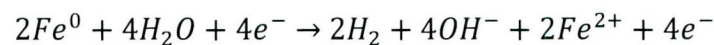
4. The EMR states in multiple locations in the body of the report that pH has increased in the monitoring wells but does not discuss the increasing trend. *Please provide text that discusses potential reasons for the increasing trend of pH in the monitoring well network and whether contaminant concentrations are being impacted.*

Response: Clarification

Within the ZVI-PRB in-wall monitoring wells, and just west of the ZVI-PRB, pH levels have increased compared to baseline. At the in-wall monitoring wells, pH level remained significantly elevated (consistently above 10). This increase could initially be associated

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with the large volume of cement grout that was used for construction of the ZVI-PRB injection wells. However, the volume of cement grout injected only accounts for 1.48% of the total ZVI volume injected. Additionally, the impacts of leaching grout would be expected to diminish over time. Therefore, the main contributor to the elevated pH levels seen in the in-wall monitoring wells is associated with the hydrolysis of water in the following half-reaction:



ZVI interactions with groundwater in an anoxic environment result in the generation of hydroxide, which then increases the groundwater pH. The elevated pH levels in the groundwater are not anticipated to negatively impact the performance of the ZVI-PRB, however the pH will continue to be monitored and considered in future reporting of the ZVI-PRB. There is discussion to support this in the EMR at the end of Section 4.4. Additional text will be added to the field measurement results sections (Section 3.2.4 for the UAZ, Section 3.3.4 for the LAZ) in future EMRs if elevated pH levels are observed.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

5. The EMR does not describe the method used to collect groundwater samples from the monitoring wells. In addition, the EMR does not contain field notes (logbook scans) or critical information like groundwater purging techniques and stabilization criteria. *Please provide text describing the general sampling protocol and provide field notes/logbook scans and sample collection logs (if completed) as attachments.*

Response: Clarification

Groundwater sample collection from monitoring wells at the ZVI-PRB are performed using dedicated bladder pumps. Well purging, monitoring for stabilization, and groundwater data collection is performed in accordance with the *ACP Programmatic Quality Assurance Project Plan for Environmental Data Collection and Management (ERD-AG-2005-00001)* and administrative procedures (e.g., WSRC-C1, *Administrative Procedure*). The sampling method details discussed in the programmatic quality assurance plan and monitoring plans are normally referenced but not repeated in EMR documentation.

During sample collection, field notes are captured electronically, and loaded into the EC&ACP Comprehensive Environmental Data Management System (CEDMS), as applicable. If field notes are available during sample collection (i.e., well pumped dry), field codes are shown on Table A under a separate column heading "Field Code" which will be at the end of the Field Data columns if required. Descriptors are provided in the

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explanation section below the table when field codes exist. For this EMR, there were no reported field codes.

SRS agrees that additional text should be included in future EMRs to discuss the presence or absence of field notes. Future EMRs will include text at the end of Section 2.5 that clarifies where field notes are captured in Table A or if there were no field notes captured for the reporting period.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

SPECIFIC COMMENTS

- 1. Section 5.0, Summary and Recommendations, Page 31:** The summary section does not discuss the increasing trends of trichloroethylene (TCE) concentrations observed in wells PRW004DU, PRW002DL and PRW006C over the last four sampling events. Also, the first quarter 2023 (1Q23) TCE results in wells PRW001DU, PRW003DL, PRW003DU and P003U located east of the ZVI-PRB are greater than baseline results (see Figure 11, TCE Results for ZVI-PRB UAZ Monitoring Wells in 1Q23) and exhibit an increasing trend since completion of the ZVI-PRB. *Please provide a discussion of the increasing TCE trends observed in wells PRW004DU, PRW002DL, and PRW006C, PRW001DU, PRW003DL, PRW003DU and P003U.*

Response: Agree with Clarification

PRW002DL and PRW004DU are located west of the ZVI-PRB in the Upper Aquifer Zone (UAZ) and have increasing TCE trends at the time of reporting (1Q23). However, rebounding of TCE concentrations was expected to be seen due to back-diffusion of TCE mass into groundwater from the high concentrations of VOCs adsorbed in low-permeability layers of the Upper Three Runs Aquifer. This back-diffusion is occurring due to the concentration gradient created from remediation of groundwater passing through the ZVI-PRB. SRS believes the diffusion of VOC mass out of low-permeability layers is beneficial to meeting the overall remediation goals in the PAGW OU. Monitoring wells PRW002DU and PRW004DL demonstrate the rebounding of TCE concentrations in the second quarter of 2020 and the fourth quarter of 2021, respectively. At PRW002DU and PRW004DL, TCE concentrations decreased back below the MCL in following sampling events. It is difficult to quantify the mass of TCE that is present in low-permeability sediments and to accurately estimate the time it will take to flush out those zones to a point where rebounding does not occur. SRS will continue to monitor for changing trends and provide discussions of any UAZ monitoring wells west of the ZVI-PRB with increasing TCE trends in Section 4.2 of future EMRs.

PRW006C is located west of the ZVI-PRB in the Lower Aquifer Zone (LAZ) and has an increasing TCE trend with a 1Q23 result of 110 ug/L. Baseline TCE concentrations in the LAZ monitoring wells located near the ZVI-PRB ranged from 195-664 ug/L. Therefore, it is reasonable that concentrations are increasing at PRW006C as higher TCE concentrations exist up-gradient. At this time, SRS does not believe the TCE trends at PRW006C are impacted by the ZVI-PRB. This is supported by the groundwater flow direction, no indications of reducing conditions, and no impact of VOC concentrations. SRS will continue to monitor for changing trends and provide discussions of any LAZ monitoring wells west of the ZVI-PRB with increasing TCE trends in Section 4.5 of future EMRs.

Monitoring wells PRW001DU, PRW003DU, PRW003DL, and P003U are located east of the ZVI-PRB, up-gradient in the UAZ. Increases in these wells are due to variability in the TCE concentrations within the UAZ plume that is migrating toward the ZVI-PRB. Further discussion is provided in response to USEPA Specific Comment #3.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

2. **Table 1, Maximum 1Q19 Concentrations of PCE, TCE, and cis-DCE in the Three Plume Areas, Page 57:** Table 1 provides useful information for maximum 1Q19 concentrations and the report would benefit if there was an additional table with the same information from the latest sampling event for comparison. *Please provide a table similar to Table 1 that contains maximum concentration data from the 2023 sampling event to facilitate comparison of results.*

Response: Agree

SRS agrees that adding the most recent sample event data to Table 1 would be useful for comparison. Future EMRs will include the most recent reporting quarter data for the three areas in Table 1. An example of this is provided as Table CR-1 included with these responses.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

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- 3. Table 4, Baseline Concentration Comparison with Most Recent Results for UAZ (1Q23), Page 60:** Table 4 provides ranges of baseline and 1Q23 TCE results for wells located East of ZVI-PRB, but it is unclear why the maximum value of the baseline range of 1.65 micrograms per liter ($\mu\text{g/L}$) – 686 $\mu\text{g/L}$ is less than the maximum value of the 1Q23 range of 1.40 $\mu\text{g/L}$ – 1000 $\mu\text{g/L}$. *Please revise the table with the correct range values or provide an explanation in the text of the document as to why the maximum value of the range for TCE increased from baseline results.*

Response: Clarification

Table 4 presents the correct data for the baseline and 1Q23 sample events. UAZ monitoring wells located east of the ZVI-PRB are considered up-gradient of the ZVI-PRB and therefore were not intended to see impacts from the emplaced ZVI. As pointed out in USEPA Specific Comment #1, the 1Q23 TCE results in some monitoring wells east of the ZVI-PRB have observed increases when compared to baseline concentrations. It is not unexpected to see increases in the TCE concentrations up-gradient of the ZVI-PRB, as the source area plume migrates down-gradient toward the neck area and therefore toward the ZVI-PRB. The monitoring wells located east of the ZVI-PRB provide support that the high concentration VOC plume continues to flow into the treatment zone. The purpose of the EMR is to compare the up-gradient VOC concentrations to the in-wall and down-gradient monitoring well results to assess effectiveness of the technology and performance of the ZVI-PRB in reducing TCE mass flux.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

- 4. Appendix A, PAGW OU RA EMR Analytical Data 2022-2023, Table A, PAGW RA EMR Monitoring Well Data 2Q22 – 1Q23, PDF Page 65:** The EMR states that reducing conditions are occurring as a result of the ZVI-PRB as indicated by the negative oxidation/reduction potential, however Table A indicates elevated oxygen results with an increasing trend observed from previous sampling events. Reducing conditions usually have oxygen results at or below 0.5 milligrams per liter (mg/L). Suspect oxygen results have been highlighted and the legend for Table A states that “Suspect erroneous oxygen results, ≤ 0 mg/L or ≥ 10 mg/L. Possibly misreported units (i.e., % verse mg/L).” *Please provide the correct oxygen data in the table or provide an explanation for the errors in misreporting the oxygen results.*

Response: Agree with Clarification

Groundwater samplers collect dissolved oxygen (DO) measurements in the field and upload the data to the SRS comprehensive environmental data management system (CEDMS). The DO meters used in the field can report DO measurements in units of mg/L or in percent saturation, which is used to calibrate the DO probe. When the data is loaded

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into CEDMS, an assumption is made that all oxygen data collected in the field was measured in mg/L.

After observing oxygen values that were above saturation limits, the project team determined that the meters may be inadvertently switched to report results in percent, as opposed to mg/L. For example, at monitoring well PIW001D, the oxygen measurement on May 5, 2022 and August 15, 2022 was 2.3 mg/L and 4.0 mg/L, respectively. However, ORP on the same dates were -353.0 mV and -402.9 mV, respectively, and DO on other dates were below 0.5 mg/L. Therefore, it is suspected the former two results were actually in percent, which would convert to approximately 0.23 mg/L and 0.4 mg/L. This would be within the range typically seen and expected at location PIW001D for reducing conditions.

When DO results are observed above saturation limits or negative, SRS believes the appropriate measure to be taken is to flag the data as misreported and discuss the outliers on a case by case basis in the report as necessary. Measurements of DO are used by SRS to augment understanding of reducing conditions created by the ZVI-PRB. To prevent this in the future, the field log format has been improved to call out the units of mg/L for all DO measurements. The improved field logs were first used in first quarter of 2024.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

MINOR COMMENTS

- Figure 7, Effectiveness Monitoring Plan Locations, Page 44:** A red oval and a larger blue oval shape are depicted in the figure, however, their meaning is not defined in the figure legend. *Please revise the figure to define the red and blue oval shapes.*

Response: Agree

The figure depicting monitoring well locations will be revised to define the red and blue polylines more clearly. What the lines represent will be defined by “Annually Sample Wells” and “Quarterly Sample Wells” below the shapes and will be color coded accordingly. An example of the figure that will be used in future EMRs is included with these responses as Figure CR-1.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

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2. **Figures 12, Time-Series Plot for TCE at UAZ Monitoring Well Clusters for P002U, PRW002, and PRW004, Page 49; Figure 13, Time-Series Plot for TCE at UAZ Monitoring Well Clusters for PRW005, PRW006, and PRW007, Page 50; Figure 15, Time-Series Plot for TCE at LAZ Monitoring Wells of the PAGW OU NTC RA EMP, Page 52; Figure 17, Cis-DCE Concentration Over Time for LAZ Monitoring Wells, Page 54; and Figure 18, CVOC Degradation at P002U, Page 55:** The figures contain colored circles in the time-series plot graphs that are not defined. It appears that the colored circles represent detected concentrations. *Please revise the legend of the figures to include a definition of what is represented by the colored circles.*

Response: Agree

SRS agrees that the colored circles in the time-series plots are not defined. The colored circles do represent detected concentrations and the symbology legend will be revised in future EMRs to include all presented symbols.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

3. *The EMR would benefit if bookmarks were included for quick reference to specific sections of the report.*

Response: Agree

SRS agrees that bookmarks would be beneficial in the PDF document and will be included in future EMRs.

No change to the 2023 EMR is proposed.

Responsible Party: Adam Willey, (803) 646-4944, adam.willey@srs.gov

**SRS Responses to USEPA Comments on the 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 2022 Through March 2023, SEMS
Number: 81, SRNS-RP-2023-01281, Revision 0, March 2024
Savannah River Site, Aiken, South Carolina**

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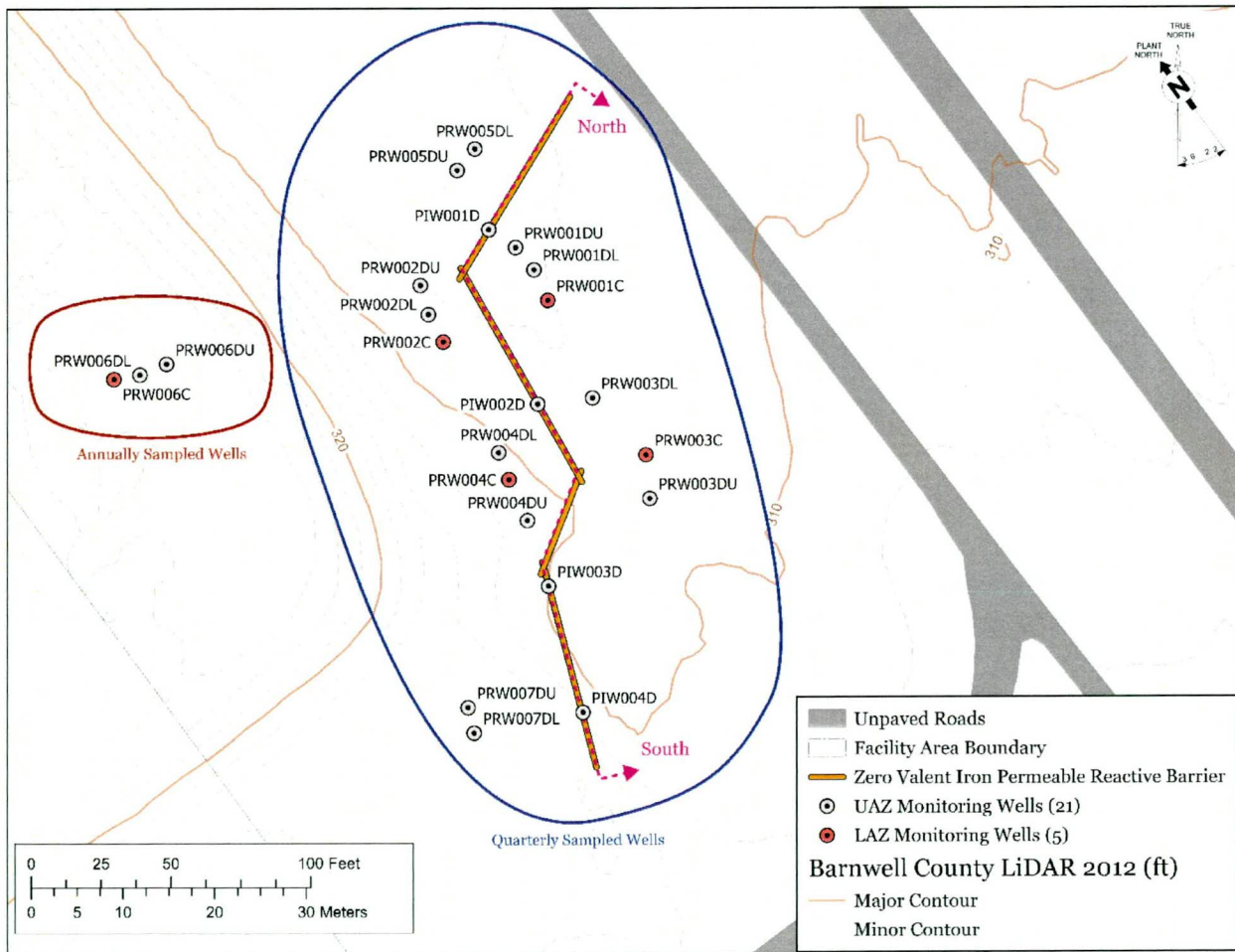


Figure CR-1. Revised Figure of Effectiveness Monitoring Plan Locations

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Table CR-1. Revised Table of Maximum Concentrations of PCE, TCE, and cis-DCE in the Three Plume Areas

Contaminant	MCL [$\mu\text{g/L}$]	Sample Event	Maximum Concentration in UAZ [$\mu\text{g/L}$]			Maximum Concentration in LAZ [$\mu\text{g/L}$]		
			Source Area	Neck Area	Distal Area	Source Area	Neck Area	Distal Area
PCE	5	1Q19	80.6	13.0	1.32	4.85	1.77	17
		1Q23	32.4	2.45	13.9	3.39	ND [1.0]	8.66
TCE	5	1Q19	2,150	7,730	6,320	5,180	(791)	5,560
		1Q23	4,480	5,240	4,830	4,180	37.8	5,980
cis-DCE	70	1Q19	195	892	(300)	69.0	138	168
		1Q23	277	532	165	70.2	35.4	122

MCL – maximum contaminant level

ND – no detections; practical quantitation limit in brackets.

Parentheses indicate estimated values (J-qualified data).