



Department of Energy
Savannah River Operations Office
P.O. Box A
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JUN 17 2025

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: Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (U) Aiken, South Carolina (SRNS-RP-2024-00934, Revision 1, June 2025) (Redline Pages), Seventh Five-Year Remedy Review Report for SRS Operable Units with Groundwater Remedies Fact Sheet (SRNS-RP-2024-00936, June 2025) (Redline Page), and Savannah River Site's Responses to the Regulatory Comments on the Revision 0 Document, SEMS Number: 00

In accordance with the terms of the Federal Facility Agreement (FFA), the U.S. Department of Energy (DOE) is submitting the subject information for your review. The Savannah River Site (SRS) submitted the *Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (U) Aiken, South Carolina* (SRNS-RP-2024-00934, Revision 1, December 2024) and supporting documentation to the regulators on December 19, 2024. The U.S. Environmental Protection Agency (EPA) and South Carolina Department of Environmental Services (SCDES) provided comments on the report on March 5, 2025, and March 19, 2025, respectively. SRS submitted the draft responses via email for regulatory review on May 14, 2025. The SCDES and EPA replied on May 28, 2025, and June 2, 2025, respectively, that the draft responses were acceptable. The final SRS' responses to the SCDES' and EPA's comments on the Revision 0 document were incorporated into the Redline Revision 1 pages for the report. The Fact Sheet was also revised based on the responses to the regulatory comments.

Please review the enclosures and provide your response within forty-five (45) days of receipt. The effort and time that the SCDES and EPA have given on the subject report are appreciated.

JUN 17 2025

Ms. Susan Fulmer
Mr. Jon Richards

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Questions from you or your staff may be directed to me at (803) 952-6211.

Sincerely,

**MATTHEW
BAKER**

Digitally signed by MATTHEW
BAKER
Date: 2025.06.16 17:02:00
-04'00'

Matthew R. Baker
Acting FFA Remedial Project Manager
DOE-Savannah River Operations Office
Remediation, Deactivation, and Decommissioning Division

RDDD-25-142

Enclosures:

1. Savannah River Site's Responses to the South Carolina Department of Environmental Services' Comments on the Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (U) Aiken, South Carolina (SRNS-RP-2024-00934, Revision 0, December 2024)
2. Savannah River Site's Responses to the U. S. Environmental Protection Agency's Comments on the Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (U) Aiken, South Carolina (SRNS-RP-2024-00934, Revision 0, December 2024)
3. Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (U) Aiken, South Carolina (SRNS-RP-2024-00934, Revision 1, June 2025) (Redline Pages) SEMS Number: 00
4. Seventh Five-Year Remedy Review Report for SRS Operable Units with Groundwater Remedies Fact Sheet (SRNS-RP-2024-00936, June 2025) (Redline Page)

cc w/o encl:

M. Reece, SCDES-Columbia
H. J. Porter, SCDES-Columbia
J. Blalock, SCDES-Columbia
S. L. French, SCDES-Columbia
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H. H. Cathcart, SCDES-Columbia
J. Dawson, EPA-Atlanta
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M. McRae, TechLaw, Inc.

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GENERAL COMMENTS

- I.** According to the Seventh FYR per- and polyfluoroalkyl substances (PFAS) was evaluated as an emerging contaminant only for the Appendix C, C-Area Groundwater (CAGW) Operable Unit (OU) (see Page C-11 of C-32, Fourth Paragraph) because of the use of aqueous film forming foam (AFFF) to extinguish a fire on a piece of forestry equipment in October 2010. The text states that elevated PFAS concentrations were found in nearby Castor Creek in 2022, and limited PFAS sampling was conducted at nearby C Area wells and Castor Creek surface water stations in the fourth quarter of 2024. The text states that this potential contamination is not directly related to C Area Operations. The Seventh FYR does not evaluate PFAS for any of the other OUs in the report because of the determination that PFAS were not identified as applicable to those OUs based on the OU history of contamination. However, it appears that only AFFF sources of PFAS have been considered in the evaluation of emerging contaminants for the C-Area Groundwater OU as well as for the other OUs in the Seventh FYR. Recent EPA guidance (EPA Federal Facilities Superfund Program – RPM Bulletin 2024-01 *Considerations When Reviewing PFAS in Five-Year Reviews* April 3, 2024) and Department of Energy (DOE) guidance and memorandums (*Addressing Per- and Polyfluoroalkyl Substances at the Department of Energy, Memorandum for Heads of Departmental Elements*, September 2021; *PFAS Strategic Roadmap: DOE Commitments to Action 2022-2025*, August 2022; and *Initial Assessment of Per- and Polyfluoroalkyl Substances at Department of Energy Sites*, October 2022) indicate that non-AFFF sources of PFAS should be considered and evaluated. Non-AFFF sources or processes such as metal plating, Manhattan project liquid discharges, Cold War era liquid waste discharges, wastewater treatment discharges, or landfills may be sources of PFAS. The undetected presence of PFAS could cause protectiveness statements to be invalid. PFAS should be evaluated for at all OUs to determine whether non-AFFF PFAS sources have caused contamination of environmental media. *Please revise the Seventh FYR to address PFAS as an emerging contaminant in the technical assessment sections and provide a recommendation that PFAS sampling be performed at all the OUs with groundwater remedies.*

Response: Agree.

Savannah River Site (SRS) conducted a screening for historical per- and polyfluoroalkyl substances (PFAS) use at these waste units using the *Guide for Investigating Historical and Current Uses of Per- and Polyfluoroalkyl Substances at Department of Energy Sites* (USDOE 2023). Appendix C of the guidance provides a standardized list of common uses at USDOE sites that have the potential for a PFAS release. The list includes the following categories:

- 1) Fire Training Facility, Fire Department, AFFF**

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- 2) Wastewater Treatment Plants and Landfills**
- 3) Uranium Enrichment, Plutonium Production, and Landfills**
- 4) Metal Plating Processing**
- 5) Explosives and Munitions**
- 6) Electronics Manufacturing**
- 7) Equipment Fuel/Maintenance**
- 8) Well Drilling**
- 9) Pesticides**
- 10) Laboratory,**
- 11) Other**

For the groundwater units included in this five-year remedy review report for SRS OUs with Groundwater Remedies (CAGW, CMP Pits, DOSB, LASG, RAOU, and RRSB), only CAGW and CMP Pits have the potential for PFAS release based on the history of use at these units as described for Categories 1 and 9, respectively. Sources of contamination for the groundwater plumes at and historical knowledge of DOSB, LASG, RAOU, and RRSB are not suspected to include PFAS contamination based on the categories above.

At CAGW OU, a piece of forestry equipment (feller buncher) caught fire in the woods south of C Area in 2010. The fire was put out by the SRS Fire Department. In 2022, the University of Georgia Savannah River Ecology Laboratory sampled Castor Creek and identified multiple PFAS compounds, including PFOS and PFOA above MCLs. This potential contamination is not directly related to C Area operations and are not a component of the IROD remedial action that addresses the contaminant source area for CAGW. PFAS sampling results will be included and discussed as part of the CAGW OU documentation to support the final ROD development (currently scheduled for issuance in 2030).

For CMP Pits OU, there are no disposal or excavation records that indicate that PFAS-containing chemicals or materials were disposed of at the CMP Pits. However, due to the various types of wastes that were disposed of at the CMP Pits, SRS acknowledges that older chemicals could have contained these compounds.

PFAS samples were collected and analyzed at CMP Pits in 4Q2023. Sampling results show that concentrations of PFAS were non-detect or were detected but at very low estimated (J-qualified) concentrations less than 1 ng/L and less than the constituents

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corresponding MCLs/RSLs. Additional information is included in the Response to EPA HQ Comments.

Source: USDOE 2023. *Guide for Investigating Historical and Current Uses of Per- and Polyfluoroalkyl Substances at Department of Energy Sites*, <https://www.energy.gov/pfas/articles/guide-investigating-historical-and-current-uses-and-polyfluoroalkyl-substances>.

Section V. Technical Assessment, Question B will include the following text changes:

There were no changes in chemical- and radiological-specific standards that would affect the protectiveness of the remedies. Although new MCLs and regional screening levels (RSLs) were established for per- and polyfluoroalkyl substances (PFAS) compounds, an evaluation of PFAS for the six OUs with groundwater remedies indicated no impact to remedy protectiveness. There were no changes in action-specific...”

Additional text in the OU-specific appendices for CAGW and CMP Pits are provided in response to EPA HQ comments.

Responsible Party: Bette Ross, (803)952-7755, bette.ross@srs.gov

2. Groundwater elevation and flow direction maps are not provided for any of the OUs covered by the Seventh FYR. The Seventh FYR should present groundwater elevation and flow direction maps for each of the OUs with groundwater remedies to support the technical assessment discussions. *Please revise the Seventh FYR to include groundwater elevation and flow direction maps for each of the OUs.*

Response: Clarification.

The individual evaluations provided in the appendices include plume maps and some trend plots to support the technical assessment discussions. Additional details, including groundwater elevation and flow direction maps, are provided in the specific groundwater monitoring reports referenced for each of the six OUs.

No change to the document is proposed.

Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov

3. Trend diagrams are provided for some but not all OUs in the Seventh FYR and interpretation of the trend in the diagrams that are in the report is provided; in some cases the trends are obviously declining, but in others it is ambiguous as to whether a trend is decreasing, increasing, or stable. No statistical analyses have been provided that definitively determine the

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direction of a trend. Use of a Mann-Kendall test to statistically assess if there is an upward or downward trend of the variable of interest over time should be used for the primary constituents of concern (COCs) for each OU. This test could help determine if a single increase in concentration is statistically anomalous. *Please revise the Seventh FYR to include statistical analysis of the trends of primary COCs for each OU with a groundwater remedy.*

Response: Clarification.

Discussions pertaining to contaminant trend data and figures showing contamination trends are included for all the appendices except RAOU. A figure showing the trend data for carbon-14 and tritium will be added to Appendix G for RAOU. The figure is included as Figure G-9 at the end of these comment responses. See the response to EPA Specific Comment #7 for additional information.

Statistical analysis has not been generically required as part of the individual groundwater monitoring reports but is performed when appropriate. For example, Mann-Kendall type analysis was performed at CMP Pits OU when the data showed any potential change in the trend. The most recent analysis was included in the 2023 annual report. Statistical analysis will be conducted on individual OUs on a case-by-case basis, as agreed to by the Core Team.

Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov

SPECIFIC COMMENTS

- 1. Section I, Introduction, Site Chronology, Page 4 of 34:** The text in the second paragraph appears to be a discussion of Appendix A, Seventh Five-year Remedy Review Report Phased Reviews; however the references to tables are confusing. The text states that Table 1 is the Five-Year Summary Review Form, which is correct for the report Table 1, but is not Table A-1, Seventh Five-Year Remedy Review Report Phases for SRS OUs, in Appendix A. The text then states that Table 2 provides a chronology of the decision documents; however, report Table 2 is a list of OUs with groundwater remedies. A chronological listing of decision documents is included in Appendix A as Table A-4, Chronologic Listing of SRS Issued Decision Documents. *Please correct the text to clarify whether tables being referred to are Appendix A tables or report tables, and to state that Table 2 is a list of OUs with groundwater remedies. In addition, revise the text to refer to Appendix A Table A-4 as to where a chronological listing of SRS issued decision documents can be found.*

Response: Agree.

The text in the last paragraph of Section 1, Site Chronology, will be revised as follows:

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~~“A chronology of site events including the effective dates for the Consent Decree, the FFA, and the NPL Listing is provided in Appendix A. A summary status of SRS is provided in Table 1 is the Five-Year Summary Review Form in Table 1, which provides a summary status of SRS. A chronology of site events including the effective dates for the Consent Decree, the FFA, and the NPL Listing is provided in Appendix A. Table 2 provides a chronology of the decision documents for the SRS OUs with groundwater remedies evaluated in this report. Chronologies of significant activities and regulatory milestones for individual OUs are included in the site-specific remedy review reports (Appendix C through Appendix H).”~~

Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov

2. **Section III, Progress Since Last Review, Page 10 of 34:** The text states that the previous protectiveness statements from the Sixth FYR concluded that all OUs were found to be protective. This section does not provide any statements on progress since the last review. *Please revise the Seventh FYR to provide a summary of progress for each OU since the previous review.*

Response: Agree.

Section III, Progress Since Last Review, will be revised as follows:

“For the OUs evaluated in this review, the previous protectiveness statements from the Sixth Five-Year Remedy Review Report (SRNS 2020) concluded that all OUs were found to be protective (Table 5). The remedy at CAGW OU was implemented as an interim action. However, exposure pathways that could lead to unacceptable risk were controlled through the interim action. There have been no new remedial actions implemented since the Sixth Five-Year Remedy Review Report (SRNS 2020) was signed by USDOE, SCDES, and USEPA and issued to the public.

There were no recommendations or follow-up actions from the Sixth Five-Year Remedy Review Report that impact the OUs with groundwater remedies evaluated in this report.

The following actions have been completed since the Sixth Five-Year Remedy Review Report (SRNS 2020) for the OUs with groundwater remedies evaluated in this report:

- **Reviewed the most recent regulatory submittals pertaining to each of the OUs;**
- **Confirmed the implementation of the remedial actions and interim remedial actions;**
- **Reviewed groundwater monitoring data to determine if MCLs were exceeded;**

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- **Inspected the OUs, interviewed maintenance personnel and documented the results on the Inspection Checklist, as required, with the purpose of assessing the protectiveness of the remedy and the functionality of the access controls; and**
- **Reviewed changes in standards and to-be-considered guidance.**

Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov

3. **Section VI, Issues/Recommendations, Page 15 of 34, and Table 7, Issues and Recommendations Identified in the Seventh Five-Year Remedy Review Report for SRS OUs with Groundwater Remedies, Page 33 of 34:** There are no recommendations or follow-up actions in the text or Table 7; however, Section VII, Protectiveness Statement(s), recommended the following: “For the C Area GW OU, unit-specific land use controls (LUCs) were not part of the interim remedy. In the *Sixth Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies* (SRNS 2017a), USDOE recommended including the CAGW OU in the list of OUs in the FFA Annual Progress Report (SRNS 2023a) that recognize SRS facility security and administrative controls that restrict unauthorized access as providing long-term protection of human health and the environment.” The text and Table 7 should include the recommendation that the CAGW OU should be included in the list of OUs in the FFA Annual Progress Report for LUCs. *Please revise the text in Section VI and Table 7 accordingly.*

Response: Clarification.

Section IV. Issues/Recommendations identifies remedial actions evaluated in this report, i.e., *Seventh Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies*. The recommendation to include the CAGW OU in the list of OUs in the FFA Annual Progress Report that recognize SRS facility security and administrative controls that restrict unauthorized access as providing long-term protection of human health and the environment was a recommendation from the *Sixth Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies* (SRNS-RP-2019-00511, Revision 1, July 2020). This recommendation has been completed and was correctly not carried forward as a recommendation in Section IV of this report.

The CAGW OU was initially included in the list of land use controls units in the FFA Annual Progress Report for Fiscal Year 2020 (SRNS-RP-2020-00712, November 2020) and has been included in each subsequent FFA Annual Progress Report.

Section VI and Table 7 will not be revised in this report. However, for clarity, the text in Section VII. Protectiveness Statements will be revised as shown below.

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“...For the CAGW OU, unit-specific LUCs were not part of the interim remedy. In the *Sixth Five-Year Remedy Review Report for Savannah River Site Operable Units with Groundwater Remedies (SRNS 2017a2020)*, USDOE recommended including the CAGW OU in the list of LUC OUs in the FFA Annual Progress Reports ~~(SRNS 2023a)~~. Since November 2020, USDOE has included the CAGW OU in the FFA Annual Progress Reports, which demonstrate long-term protectiveness by that recognizing SRS facility security and administrative controls that restrict unauthorized access as providing long term protection of human health and the environment. The FFA Annual Progress Report is required by the FFA and includes an annual certification by the USDOE Savannah River Operations Manager that the listed OUs ~~are in compliance~~ comply with land use requirements.”

Responsible Party: Shelia McFalls, (803)952-6819, shelia.mcfalls@srs.gov

- 4. Appendix D, Chemicals, Metals, and Pesticides (CMP) Pits (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G, And 080-190G OU, Section VII, Technical Assessment, “Is the Remedy Functioning as Intended by the Decision Document?” Page D-13 of D-32:** The text in the second bullet indicates that there are increasing concentrations of tetrachloroethylene (PCE) and lindane but concludes that the remedial activities are meeting remedial action objectives (RAOs); however, it is unclear how the RAO to reduce the COCs in the groundwater plume to maximum contaminant levels (MCLs) is being met when concentrations of COCs are increasing. This suggests the monitored natural attenuation (MNA) remedy is not effectively remediating the groundwater contamination. *The Seventh FYR should discuss how the increasing COCs are not related to an issue with MNA remedy performance. Additionally, the Seventh FYR should provide a recommendation and follow-up actions that additional remedial action may be required should PCE and/or lindane concentrations continue to increase above cleanup levels.*

Response: Clarification.

Of the 11 groundwater RCOCs identified in the ROD, only four (TCE, PCE, CCL4, and lindane) are still detected above MCLs. As presented in the July 2024 CMP Pits Effectiveness Monitoring Report (SRNS-RP-2024-00606, Revision 0, July 2024), statistical GSI Mann-Kendall trend analysis for data post-ERH/SVE remediation) was conducted. Most of the monitoring wells (85%) show a declining or steady (including consistent non-detects and no-trend) trend in PCE and TCE over the past 13 years. Only one well exceeding the MCL for lindane shows an increasing trend. The overall concentration declines, horizontal extent decrease for the plume cores, and no significant impact to surface water support the conclusion that MNA is still an effective remedy.

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A new bullet will be added after the fourth bullet in Section VII., Technical Assessment in Appendix D will be updated to include this information on statistical trend analyses in an additional bullet as follows:

- **“Monitoring wells were analyzed using GSI Mann-Kendall trend analysis for data post-ERH/SVE remediation (2010-2022 data, as available) and updated to include 2023 data if data indicated changes to those trends. Most of the monitoring wells (85%) show a declining or steady (including consistent non-detects and no-trend) trend for PCE and TCE and (93%) for lindane over the past 13 years.”**

SRS acknowledges the concern of increasing concentrations in a handful of wells and over the last five years has been conducting additional field investigations to further characterize any residual contamination in the source area, updating the CMP Pits groundwater model with these results and new groundwater data, and conducting additional investigations in the wetland area around Pen Branch (i.e., permanent stream gauge flow stations and installation of shallow groundwater wells beneath Pen Branch). Results from some of these activities are incorporated into the annual EMRs, and 2024 data will be discussed within the upcoming June 2025 EMR. After review of the EMR, a meeting between USDOE, USEPA, and SCDES will be planned in the second half of 2025 to further discuss the results of these investigations and assessments and determine any follow up actions for the CMP Pits OU.

With the ongoing investigations and future 2025 meeting planned between USDOE, USEPA, and SCDES, SRS does not believe that identifying additional recommendations or follow-up actions related to additional remedial action is warranted at this time.

No changes to Appendix D, Section IX., Recommendations and Follow-up Actions are proposed.

Responsible Party: Ashley Shull, (803)952-7090, ashley.shull@srs.gov

5. **Appendix F, L-Area Southern Groundwater Operable Unit, Section VII, Technical Assessment, “Is the Remedy Functioning as Intended by the Decision Document?” Page F-10 of F-32:** The text in the second full paragraph states contaminant levels are not increasing and references Figure 7, Time Series Plot for Tetrachloroethylene (PCE) Station LAC 8; however Figure F-7 shows that the PCE concentration increased from approximately 2 ug/L to slightly over 5 ug/L in the most recent sampling event and has been increasing since 2020. Also, data for trichloroethylene (TCE) are not presented and the TCE concentration trend is unclear. *Please provide the TCE data trend similar to the PCE trend, and revise the text to*

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reflect that PCE has been increasing since 2020 and concentrations are currently above the MCL as shown by the most recent PCE result.

Response: Agree.

Figure F-7 shows that PCE concentrations did not increase until 2023 with a concentration slightly above the 5 µg/L. Additionally, the 4Q2024 sampling results show PCE concentrations down to 1.98 µg/L. Although TCE concentrations at LAC 8DL did increase in 2023, the concentration of 1.49 µg/L was below the MCL of 5 µg/L. Likewise, the 4Q2024 sampling results show TCE concentrations down to 0.5 µg/L. The 4Q2024 sampling results are not discussed in this remedy review report. These sampling results will be discussed in the effectiveness monitoring report (sampling summary) for MNA at the LASG to be submitted in 2026.

The third paragraph in Section VII, Technical Assessment, *Is the Remedy Functioning as Intended by the Decision Document* will be updated to note the increase in LAC 8DL as follows:

“... Contaminant levels are generally not increasing, with the exception of one increase in 2023 at well LAC 8DL for PCE and TCE (Figures F-7 and F-8), and the plumes...”

Figure F-8 attached to the end of these comment responses, presents the trend data for TCE at LAC 8DL. This figure will be added to Appendix F and subsequent figure numbering will be adjusted as needed.

Responsible Party: Ashley Shull, (803)952-7090, ashley.shull@srs.gov

- 6. Appendix F, L-Area Southern Groundwater OU, Section VII, Technical Assessment, “Is the Remedy Functioning as Intended by the Decision Document?” Page F-10 of F-32, and Figure F-8, L- LRSB and LAOCB Performance Monitoring Station Locations, Page F-22 of F-32: The text states that based on the 2020 data results there are no contaminant migration concerns with the associated surface units from the L-Area Reactor Seepage Basin (LRSB) and L-Area Oil and Chemical Basin (LAOCB) based on performance monitoring, and references Table F-5, LAOCB and LRSB Performance Monitoring Results (2016) and Figure F-8. However, Table F-5 presents 2016 and not 2020 monitoring results and Figure F-8 (dated 12/13/2012) does not present data from performance monitoring. *Please revise Table F-5 to present the 2020 monitoring results and revise Figure F-8 to present the concentrations relative to performance monitoring sample results.***

Response: Clarification

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Table F-5 (attached) will be updated to include the 2020 LAOCB and LRSB results and is provided at the end of these comment responses. Figure F-8 is provided to show the locations of the three groundwater wells used in relation to the LAOCB and LRSB. Since groundwater results are below applicable limits, no concentrations are listed on the map and there are no groundwater plumes in the area to depict.

No changes to Figure F-8 are proposed. However, Figure F-8 will be renumbered to F-9 based on the response to USEPA Specific Comment #5.

Responsible Party: Ashley Shull, (803)952-7090, ashley.shull@srs.gov

7. **Appendix G, R-Area Operable Unit, Section VII, Technical Assessment, “Is the Remedy Functioning as Intended by the Decision Document?” Page G-16 of G-46:** The text in the first paragraph discusses generally decreasing trends of carbon-14 and tritium; however, there are no figures or trend diagrams supporting these statements. *Please provide trend diagrams for the COCs to support statements that trends are stable or decreasing, consistent with figures provided for the other OU evaluations.*

Response: Agree.

Figure G-9, attached at the end of these comment responses, indicates that well RDB 3D is decreasing in tritium concentration since 2017 when the highest concentration in the last 20 years was sampled. Since 2017, tritium concentrations indicate a downward trend. Likewise, carbon-14 concentration in well RDB 3D are decreasing since the maximum concentration reported in 2020. No other RAOU in situ decommissioning (ISD) monitoring wells have had detectable carbon-14 concentrations above the PQL/SQL.

The last paragraph in Section VI. Five-Year Review Process, Data Review, as follows:

“Wells RDB 1D, RDB 2D, RDB 3D, RDB003DU, and RDB005C were sampled annually and analyzed for carbon-14 and tritium until 2022 to ensure the observed carbon-14 is only an isolated problem. Results of the sampling indicate that tritium and carbon-14 concentrations are decreasing (Figure G-9). The maximum tritium concentration over the last 20 years was sampled for well RDB 3D in 2017. The maximum carbon-14 concentration was sampled for well RDB 3D in 2020. No other RAOU ISD monitoring wells have had detectable carbon-14 concentrations.”

Figure G-9 will be included in Appendix G for the RAOU. Subsequent figure numbering will be adjusted as needed.

Responsible Party: Terry Killeen, (803)952-6850, terry.killeen@srs.gov

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EPA HQ COMMENTS:

EXPECTATIONS FOR PFAS AND EMERGING CONTAMINANTS IN FIVE-YEAR REVIEWS:

After reviewing numerous five-year reviews, *FFRRO* has observed the following best practices in addressing PFAS and other emerging contaminants of potential concern in Five-Year reviews:

- a. Progress Since Last Review: This may be an appropriate location to summarize the status of the investigation into PFAS or other emerging contaminants, such as 1,4-dioxane.
- b. Data Review: This section may be an appropriate location if there are data pertaining to emerging contaminants to review.

Note that in either (a) or (b), the description of PFAS should include a concise summary of the scope of the investigation to date, and the results should be screened as set forth in the latest EPA and DOD guidance (e.g. DOD 2019, EPA 2019, DOD 2020, etc.)

- c. Technical Assessment: In most cases, Question B is the most appropriate place to address PFAS and other emerging contaminants. Specifically, the guidance asks to review exposure assumptions, including the detection or presence of new contaminants (Page 4-5 of 2001 Guidance).

Exhibit 4-1: Three Questions Used to Determine Whether a Remedy is Protective

When you ask...	you should consider whether...
<p>Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?</p>	<ul style="list-style-type: none"> • there are changes in standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD, newly promulgated standards, and/or changes in TBCs identified in the ROD, that could call into question the protectiveness of the remedy; • there are changes in land use or the anticipated land use on or near the site; • new human health or ecological exposure pathways or receptors have been identified; • new contaminants or contaminant sources have been identified; • there are unanticipated toxic byproducts of the remedy not previously addressed by the decision documents; • there are changes in the physical site conditions; and • there are changes in the toxicity factors for contaminants of concern.

- d. Issues/Recommendations: This section should include any issue(s) identified and proposed follow-on actions as needed. This section can also be used to describe how emerging contaminants will be addressed going forward.
- e. Protectiveness Determinations: Facilities are selecting short-term protective if they have at least a preliminary understanding of PFAS contamination and are confident

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that there are no current drinking water exposures. Facilities are selecting to defer protectiveness if the characterization is incomplete. Other emerging contaminants should be addressed in a similar manner.

References:

- EPA, 2001. Comprehensive Five-Year Review Guidance. EPA 540-R-01-007. June 2001.
- EPA, 2012. Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews. OSWER 9200.2.111. September 13, 2012.
- EPA, 2019. Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate. OLEM Directive No 9283.1-47. December 19, 2019.
- DOD, 2019. Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October 15, 2019.
- DOD, 2020. Per-and Polyfluoroalkyl Substances Sampling of Department of Defense Drinking Water Systems. March 2, 2020.

Response: Agree.

See response to EPA General Comment #1.

Regarding 1,4-dioxane, this emerging contaminant has already been evaluated for all SRS OUs per the recommendation from the *Fourth Five-Year Remedy Review for Savannah River Site* (SRNS 2013).

SRNS, 2013. *Fourth Five-Year Remedy Review Report for the Savannah River Site*, SRNS-RP-2012-00011, Revision 0, Savannah River Nuclear Solutions, LLC, Aiken, SC.

The following text will be added to Appendix D, Section VII, Technical Assessment, Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid?:

“Except for PFAS, None of these emerging contaminants were identified as applicable to this OU based on the OU history of contamination.

There are no disposal or excavation records that indicate that PFAS containing chemicals or materials were disposed of at the CMP Pits. However, due to the various types of wastes that were disposed of at the CMP Pits, SRS acknowledges that older chemicals could have contained these compounds. In 4Q2023, three samples were taken from two CMP Pits wells (CMP011A and CMP 35D) and were analyzed for PFAS analytes using EPA method 1633 for the two regular samples at each well and

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EPA Method 533 for one split sample at CMP011A. Well CMP011A is an upgradient Gordon Aquifer well that does not exhibit chlorinated solvent or lindane contamination. CMP 35D is a shallow well and is located directly downgradient of the CMP Pits trenches. This well shows the highest levels of chlorinated solvents (e.g., trichloroethylene and tetrachloroethylene) and lindane contamination and, therefore, would be the most likely well to display any potential PFAS contamination.

Both the regular and split sample results from CMP011A were non-detect for PFAS constituents. At CMP 35D, five PFAS constituents including perfluoro-n-butanoic acid [PFBA], perfluoro-3-methoxypropanoic acid [PFMPA], perfluorohexanoic acid [PFHxA], perfluorooctanesulfonic acid [PFOS], and perfluorobutanesulfonic acid [PFBS]) were detected at very low estimated (J-qualified) concentrations less than 1 ng/L and less than the constituents corresponding MCLs/RSLs (Table D-6).

Since the results are non-detect or less than 1 ng/L and below the RSLs, no additional sampling will be required.”

For CAGWOU, discussion of PFAS is included in Appendix C, Section VII, Technical Assessment, Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid?. Additionally, the following text will be added as the last sentence in Appendix C, Section VII, Technical Assessment, Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid? as follows: “PFAS characterization will be included and discussed in the documents to support the final ROD for the CAGW OU.”

Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov

QUESTIONS FOR FYRS: There are four issues considered in the PFAS and Emerging Contaminants Review, which guide our recommendations:

1. Scope and Documentation: Where was sampling and evaluation for PFAS and/or other emerging contaminants summarized? Is the scope appropriate and were current guidance referenced and followed?
2. Technical Assessment: Were emerging contaminants included in Question B?
3. Issues and Recommendations: Were issues pertaining to the emerging contaminants identified? How were they addressed via recommendations?
4. Protectiveness: Does the presence of emerging contaminants affect protectiveness?

RECOMMENDATIONS:

#	Page	Comment	Category
1	Overarching	Additional documentation is needed in the main body of this report. Three questions need to be addressed:	Scope and Documentation

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		<p>How were PFAS used at this site? Where are PFAS known or suspected to be present in GW? Is there reason to believe that the nature and extent of PFAS at SRS is beyond any of the controls that are in place? Answers to these questions are needed to determine if PFAS may be impacting protectiveness of any of the existing remedies.</p> <p>Response: Agree.</p> <p>See response to EPA General Comment #1. Specific PFAS information is included in more detail in Appendices C and D for the two units that have the potential for PFAS contamination.</p> <p>Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov</p>	
2	Overarching	<p>If PFAS investigations are ongoing then this needs to be captured under Issues, with next steps identified under Recommendations.</p> <p>Response: Clarification.</p> <p>No further PFAS or other emerging contaminant investigations are required for the six groundwater OUs addressed in this Five-Year Remedy Review Report. Therefore, no Issues or Recommendations are warranted. See the response to EPA General Comment #1 for additional information.</p> <p>Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov</p>	Issues and Recommendations
3	C-11	<p>Area C GW -PFAS is a potential GW contaminant from fire-fighting activity and PFAS has been detected in streams within the area boundary. Additional sampling is ongoing. Therefore, the need to complete PFAS sampling and determine if any additional actions are needed must be captured under Issues and Recommendations.</p> <p>Response: Clarification.</p> <p>As discussed in Appendix C, Section VII, Technical Assessment, Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid?, limited PFAS sampling was conducted in 4Q2024. PFAS sampling will be included and discussed in the CAGW</p>	Issues and Recommendations

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		<p>OU investigation to support the final ROD issuance. This potential PFAS contamination is not directly related to C-Area operations and is not a component of the IROD remedial action that addresses the contaminant source area for the CAGW OU. The following text will be added as the last sentence in Section VII, Technical Assessment, Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Still Valid?, “<u>PFAS characterization will be included and discussed in the documents to support the final ROD for the CAGW OU.</u>”</p> <p>Responsible Party: Terry Killeen, (803)952-6850, terry.killeen@srs.gov</p>	
4	C-12	<p>Insufficient information has provided to conclude whether PFAS releases have had an impact on either human or ecological health. Sufficient information is needed to make a case that protectiveness has not been impacted. In any event, due to the uncertainty caused by the presence of PFAS, we do not see how the remedy can continue to be categorized as protective. To be short-term protective, SRS needs to demonstrate that there are current exposure pathways. High uncertainty may warrant a deferral of protectiveness.</p> <p>Response: Clarification.</p> <p>As previously discussed, the potential PFAS contamination is not directly related to C-Area operations and are not a component of the IROD remedial action that addresses the contaminant source areas for CAGW OU. The remedies identified in the IROD that are currently in place for the TCE and tritium source zones are appropriate and protective of human health and the environment.</p> <p>No changes to the text are proposed.</p> <p>Responsible Party: Sadika O’Quinn, (803)952-6697, sadika.oquinn@srs.gov</p>	Protectiveness

EPA ORC COMMENTS:

Comment #1: Page 14 of 34 (PDF Page 26), Response to Question A: Consider including a bullet point addressing LUCs and institutional controls in the response to Question A. *See*

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Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P, June 2001, at 4-1, Exhibit 4-1 (“When you ask Question A: Is the remedy functioning as intended by the decision documents? [Y]ou should consider whether . . . access (e.g. fencing, security guards) and institutional controls needed at the particular stage of the remediation are in place and prevent exposure . . .”). See also *id.* at 4-3 (“Your review of an operating or completed remedial action generally will address more aspects of the remedy implementation than a review of a remedial action under construction. In general, you should consider assessing the following: . . .

Implementation of institutional controls: Determine whether access controls (e.g. fencing, security guards) and LUCs that are needed at this stage of the remediation are in place and successfully prevent exposure”).

Response: Agree.

The bullet listed below will be added to Section V. Technical Assessment, Question A: Is the remedy functioning as intended by the decision documents?

- **“For all final remedial actions, LUCs are in place and are effective in preventing unauthorized access to the groundwater and include physical access controls to SRS (e.g., fences, guards, security patrols, etc.) and administrative controls (SRS is a secured government facility with land use restrictions and a Site Use/Site Clearance program). LUCs may be part of the final remedial action at CAGW OU. In the interim, the CAGW OU is included in the FFA Annual Progress Reports to demonstrate long-term protectiveness through the SRS facility security and administrative controls that restrict unauthorized access.”**

Responsible Party: Shelia McFalls, (803)952-6819, shelia.mcfalls@srs.gov

Comment #2: Page C-12 of C-32 (PDF page 96), Section X. Protectiveness Statement(s): In the prior Sixth Five-Year Review, on page C-4 of C-32 of that document, the proposed issue date for the CAGW OU ROD was April 2027. The current Seventh Five-Year Review states that the proposed Final Rod Issue Date is April 2030. Consider including a sentence stating why the proposed issue date has changed.

Response: Clarification.

During submittal of the FFA Revision 0, Long-Term Projections for FY2022 (IACD-22-105, dated November 15, 2021), the USDOE proposed to move the CAGW OU final action out three years to evaluate the effectiveness of the removal action (i.e., treatment barrier using emulsified edible oil for the distal portion of the CAGW OU trichloroethylene groundwater plume). The removal action was conducted in July and August 2019. Effectiveness monitoring and reporting of the removal action and

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the broader C-Area Groundwater OU monitoring network is ongoing. The SCDES and USEPA provided comments on the Revision 0 FFA Appendix E submittal in their letters dated December 20, 2021, and January 2, 2022, respectively. USDOE submitted the Revision 1 FFA Appendix E for FY2022 and the responses to the regulatory comments on January 24, 2022 (IACD-22-122). SCDES and USEPA approved the Revision 1 FFA Appendix E submittal in their letters dated February 14, 2022. Upon regulatory approval of the Revision 1 FFA Appendix E, the proposed schedule for CAGW OU was finalized.

No change to the document is proposed.

Responsible Party: Shelia McFalls, (803)952-6819, shelia.mcfalls@srs.gov

Comment #3: Appendix E, Page E-8 of E-18, first bullet point: Appendix E states that Concentrations of PCE in the AQ1/2, AQ3, and GAU aquifers continue to slowly decrease or remain similar to concentrations from previous sampling. The most recent data at the DOSB from the year 2023 shows that PCE exceeded the MCL (5µg/L) at only DOB 15, a plume compliance well. There was no exceedance of the MCL at any of the boundary compliance wells.

However, in the prior 6th Five Year Review (Appendix E at page E-8 of E-42), “PCE was below the MCL of (5ug/L) in all wells at the DOSB. . . .” Thus, the data showing that PCE exceeded the MCL in a well is contrary to the first sentence, that “[c]oncentrations of PCE . . . continue to slowly decrease or remain similar to concentrations from previous sampling.” Revise to address accordingly.

Response: Agree.

The text in Section VI. Five-Year Review Process, Data Review will be revised as follows:

“Concentrations of PCE in the AQ1/2, AQ3, and GAU aquifers continue to slowly decrease or remain similar to concentrations from previous sampling with the exception of plume compliance well DOB 15 which ~~The most recent data at the DOSB from the year 2023 shows that PCE exceeded~~ had an exceedance of PCE above the MCL (5 µg/L) in 2023 ~~at only DOB 15, a plume compliance well.~~ There was no exceedance of the MCL at any of the boundary compliance wells.”

Figures E-14 and E-15 (attached) which portray time series plots for PCE and TCE will be added to appendix. Subsequent figures will be renumbered as warranted.

Responsible Party: Rohit Goswami, (803)989-5383, rohit@srs.gov

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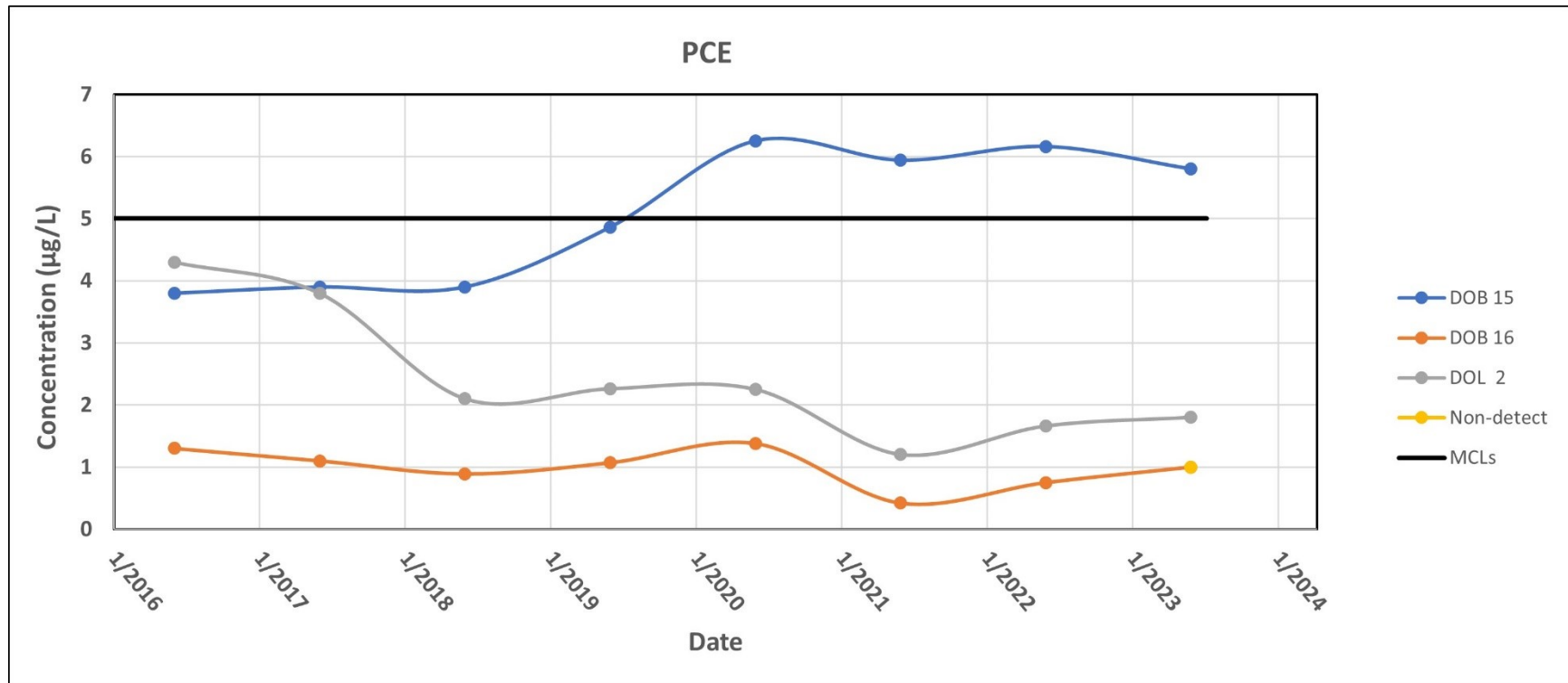


Figure E-14. Time Series Plots for PCE at Wels DOB 15, DOB 16, and DOL 2 at the DOSB OU

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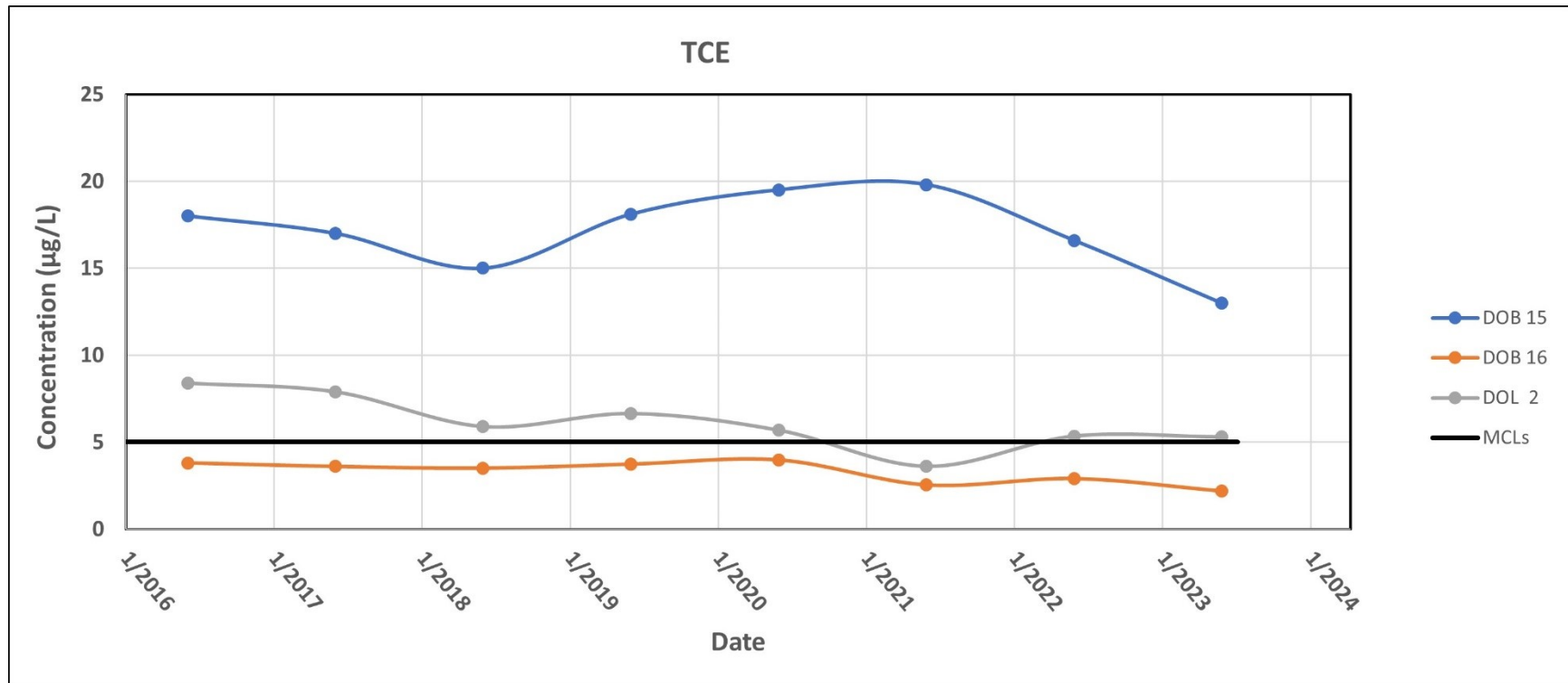


Figure E-15. Time Series Plots for TCE at Wels DOB 15, DOB 16, and DOL 2 at the DOSB OU

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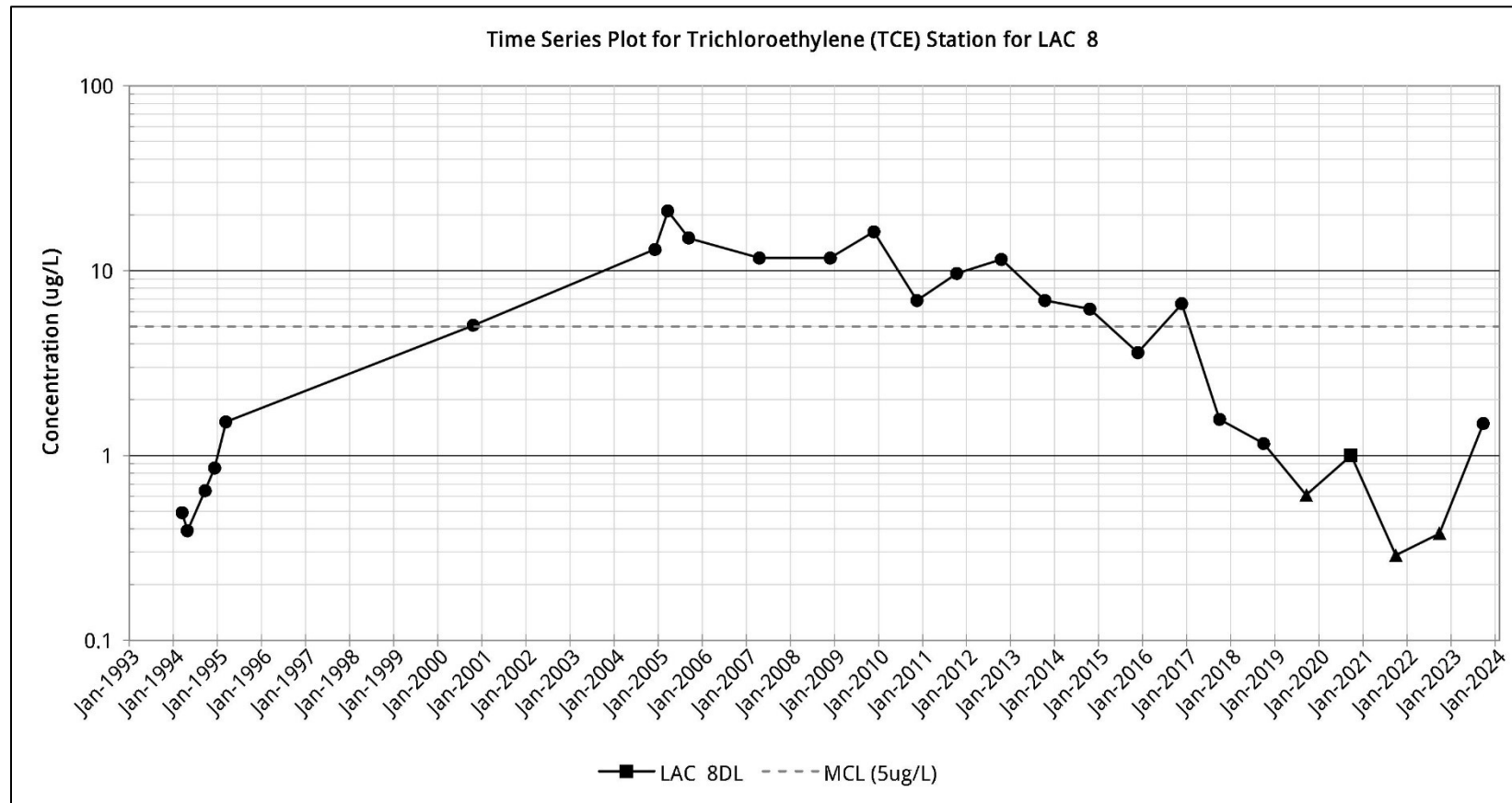


Figure F-8. Time Series Plot for TCE for Source Zone Well LAC 8DL

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Table F-5. LAOCB and LRSB Performance Monitoring Results (2016-2020)

	CARBON-14	COBALT-60	GROSS ALPHA	NONVOLATILE BETA	STRONTIUM-90	TRITIUM
LAOCB Results						
Units	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/mL
MCL/PRG	2,000	100	15	50	8	20
LCO 2DL (08/24/2016-10/13/2020)	4.6 U ND	-3.17 U ND	3.49 J ND	1.66 U ND	0.633 U ND	0.155 U ND
LCO 6DL (8/25/2016-10/12/2020)	358	0.239 U ND	2.31 U 2.81 J	1.02 U ND	0.939 U ND	0.78 J 1.5
LCO 6DL Lab Dup	NA	NA	NA	NA	0.124 U	0.871 J
LRSB Results						
LSB 4 (8/24/2016-10/12/2020)	NA	NA	NA	NA	0.971 U ND	NA
LSB 4 Lab Dup	NA	NA	NA	NA	-1.26 U	NA
U – Non-Detect						
J – Estimated Value						
Detection without a qualifier						
Exceeds MCL/Preliminary Remediation Goal						

J- Qualifier on a value indicates that the analyte was positively identified in the sample at a concentration below the quantitation limit; the reported value is estimated.

NA = not analyzed

ND = not detected

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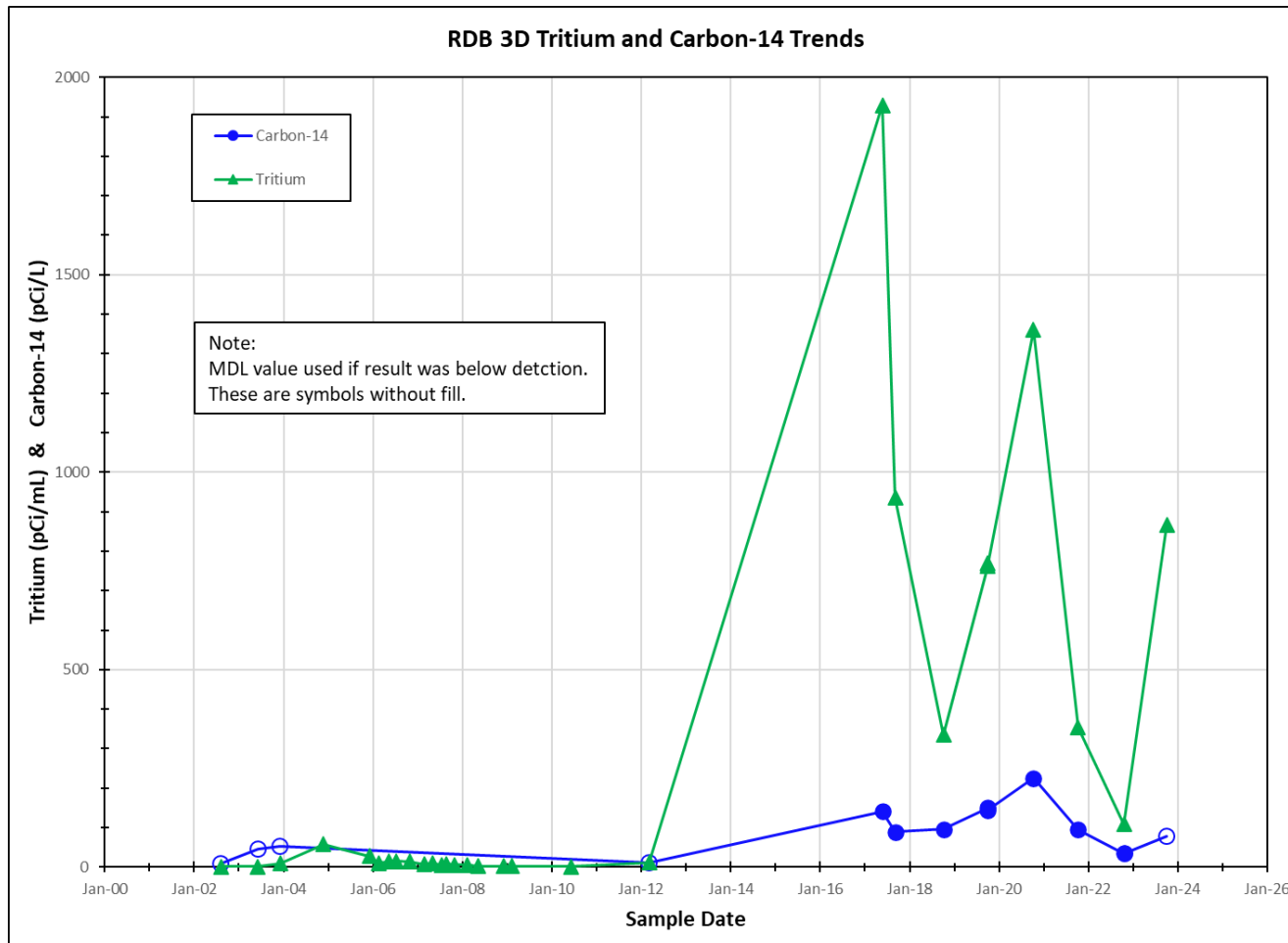


Figure G-9. Tritium and Carbon-14 Trend Data in well RDB 3D at RAOU

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Table D-6. 4Q2023 CMP Pits PFAS Results (ng/L) (ppt)

Station	Method	¹¹ CL- PF3OUDS	3:3FTCA	4:2 FTS	5:3FTCA	6:2 FTS	7:3FTCA	8:2 FTS
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	--	--	--	--	--
CMP-011-A	1633	ND	ND	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	ND	--	ND	--	ND	--	ND
CMP-035-D	1633	ND	ND	ND	ND	ND	ND	ND

Station	Method	⁹ CL- PF3ONS	ADONA	GENX	MEFOSA	NEtFOSA	NETFOSAA	NEtFOSE
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	10	--	--	--	--
CMP-011-A	1633	ND	ND	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	ND	ND	ND	--	--	--	--
CMP-035-D	1633	ND	ND	ND	ND	ND	ND	ND

Station	Method	NFDHA	NMEFOSAA	NMcFOSE	PFBA	PFBS	PFDA	PFDoA
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	--	18.000	6.000	--	1.000
CMP-011-A	1633	ND	ND	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	ND	--	--	ND	ND	ND	ND
CMP-035-D	1633	ND	ND	ND	[0.77]	[0.13]	ND	ND

Station	Method	PFDoS	PFDS	PFEESA	PFHpA	PFHPS	PFHxA	PFHxS
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	--	--	--	9,900	10
CMP-011-A	1633	ND	ND	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	--	--	--	ND	ND	ND	ND
CMP-035-D	1633	ND	ND	ND	ND	ND	[0.5]	ND

Station	Method	PFMBA	PFMPA	PFNA	PFNS	PFOA	PFOS	PFOSA
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	10	--	4	4	--
CMP-011-A	1633	ND	ND	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	ND	ND	ND	--	ND	ND	--
CMP-035-D	1633	ND	[0.72]	ND	ND	ND	[0.29]	ND

Station	Method	PFPeA	PFPEs	PFTA	PFTrDA	PFUnA
<i>USEPA MCL/RSL (ng/L)</i>	-	--	--	20,000	--	6,000
CMP-011-A	1633	ND	ND	ND	ND	ND
CMP-011-A (Split)	533	ND	ND	--	ND	ND
CMP-035-D	1633	ND	ND	ND	ND	ND

[##] = Estimated J-qualified result
 ND = Not detected
 -- = Analyte not included in method