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

ARF-024046

JAN 19 2023

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

Mr. Jon Richards
Savannah River Site Remedial Project Manager
Superfund 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 K-Area Burning/Rubble Pit and Rubble Pile (131-K and 631-20G) (KBRP) and P-Area Burning/Rubble Pit (131-P) (PBRP) Operable Units Detailed Combined Groundwater Monitoring Report (SRNS-RP-2022-00253, Revision 0, June 2022) SEMS Numbers: 40 and 59

In accordance with the terms of the Federal Facility Agreement, the U. S. Department of Energy (DOE) is submitting the subject comment responses for your review. The U.S. Environmental Protection Agency's (EPA) and the South Carolina Department of Health and Environmental Control's (SCDHEC) comments were received on August 29, 2022 and October 27, 2022, respectively. This report will not be revised; however, the comment response will be included in the next report, as applicable. Please review the responses and provide your approval thirty (30) days from receipt. The effort and time that the SCDHEC and the EPA have given on the subject operable units are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-8365, or DOE Program Manager, Mr. Philip Prater, at (803) 952-9333.

Sincerely,

Brian T. Hennessey

Digitally signed by Brian T. Hennessey
Date: 2023.01.18 11:13:10 -05'00'

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division

IACD-23-121

Enclosures:
1. SRS Responses to Environmental Protection Agency Comments on the K-Area Burning/Rubble Pit and Rubble Pile (131-K and 631-20G) (KBRP) and P-Area Burning/Rubble Pit (131-P) (PBRP) Operable Units Detailed Combined Groundwater Monitoring Report (SRNS-RP-2022-00253, Revision 0, June 2022) SEMS Numbers: 40 and 59
2. SRS Responses to South Carolina Department of Health and Environmental Control Comments on the K-Area Burning/Rubble Pit and Rubble Pile (131-K and 631-20G) (KBRP) and P-Area Burning/Rubble Pit (131-P) (PBRP) Operable Units Detailed Combined Groundwater Monitoring Report (SRNS-RP-2022-00253, Revision 0, June 2022) SEMS Numbers: 40 and 59

cc w/o encl:
J. Blalock, SCDHEC-Columbia
S. French, SCDHEC-Columbia
M. Reece, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
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T. R. Fuss, SCDHEC-Aiken Environmental Affairs Office
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H. L. Herlong, SCDHEC-Aiken Environmental Affairs Office
R. H. Pope, EPA-Atlanta

cc w/ encl:
M. McRae, TechLaw, Inc.

SPECIFIC COMMENTS

1. **Section 2.0, Site Hydrogeology, page 2.** This section and further sections of the report refer to the "water table aquifer" at the KBRP OU. Please identify the specific aquifer that "water table aquifer" refers to in this section so that later references to the "water table aquifer" are clear about the exact aquifer being described. Section 3.2.5, Lateral and Vertical Extent of Contamination at the PBRP OU, page 14, offers a good example of this for the PBRP OU: "The water table aquifer beneath the PBRP OU represents the "upper" aquifer zone of the UTRAU. The top of the upper aquifer zone is ~7 m (23 ft) below ground surface and ~17 m (57 ft) thick down to a locally continuous tan clay."

   Response: Agree with Clarification.

   Section 2.0 describes the general hydrogeology found at SRS. A description of the water table aquifer at the KBRP will be included in Section 3.1.1 in future reports to state the following:

   "...<u>The water table aquifer beneath the KBRP OU represents the "upper" aquifer zone of the UTRAU. The top of the upper aquifer zone is ~14.6 m (48 ft) below ground surface and ~15.2 m (50 ft) thick down to the tan clay semi-confining zone.</u>"

   Responsible Party: Justin Steadman, (803) 952-7346, <u>justin.steadman@srs.gov</u>

2. Section 3.1.2.4, Sampling Frequency, page 7. The last paragraph of Section 3.1.2.4 describes response actions that will be taken if trigger levels are exceeded during future sampling events. Please add a similar discussion to the document prior to Sections 3.1.2.1 through 3.1.2.3, which define the trigger levels for PCE and TCE in the plume, intermediate, and compliance boundary wells. This addition would make the document clearer to the public by providing background on what the trigger levels represent before defining the above-referenced trigger level values in Sections 3.1.2.1 through 3.1.2.3.

   Response: Agree with Clarification.

The last paragraph of Section 3.1.2.4 will be removed as it will be moved prior to discussion of the trigger levels at each well type. The last paragraph of section 3.1.2 will be updated in future reports as follows:

"...The objective of the network is to demonstrate compliance with MCLs at the compliance boundary and with the MZCLs at the plume and intermediate wells. The MCLs and MZCLs are also referred to as trigger levels. If the respective trigger levels for PCE or TCE are exceeded, the affected well(s) will be resampled within 30 days of receipt of a validated data report to confirm this exceedance. If the trigger level is exceeded in the validated confirmation sample(s), SRS will convene the Core Team to discuss a path forward. If daughter products exceed their MCL, SRS will report the results and the need for confirmatory sampling will be evaluated (WSRC 1999a). Groundwater flow and transport modeling of KBRP (WSRC 1999b) established MZCLs..."

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

GENERAL COMMENTS

1. It is unclear whether trichloroethylene (TCE) is being sufficiently monitored at surface-water stations in the P-Area Burning/Rubble Pits Operable Unit (PBRP OU). For example, Section 3.2.5 (Lateral and Vertical Extent of Contamination at the PBRP OU) states that "SRS believes that any impact to Steel Creek from the PBRP OU is insignificant, as evidenced by years of no detections of 1,1-DCE within Steel Creek" and Table 5 (Steel Creek Surface-Water Station Data) is referenced for results of 1,1-dichloroethylene (DCE) at surface-water stations SC-02, SC-03 and SC-04. Additionally, Section 3.2.1 (PBRP OU Background) states "Groundwater was determined to be contaminated with 1,1-DCE and TCE only in the area adjacent to the south side of the PBRP and not farther south towards Steel Creek." However, this statement contradicts the text in Section 3.2.5 (Lateral and Vertical Extent of Contamination at the PBRP OU) which states, "Surface-water station SC-03 has traditionally exhibited elevated levels of TCE and is currently the primary area where the PAGW OU [P-Area Groundwater Operable Unit] VOC [volatile organic compound] plume is discharging." Therefore, as TCE concentrations appear to be increasing at monitoring well PRP 6, and the water table aquifer discharges to Steel Creek, downstream surface-water stations should be monitored. *Please revise the text to indicate whether TCE is currently being monitored at surface-water stations and if so, include available historical data in the Report as an additional line of evidence to support no surface-water impacts.*

Response: Clarification.

Historical data from the RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA) for the P-Area Burning Rubble Pit, WSRC-RP-98-4174, Revision 1.1, April 2001, indicated that impacts to Steel Creek were from upgradient sources and therefore impacts to Steel Creek from the PBRP OU were negligible. The 1998 surface water data and sampling locations from the RFI/RI/BRA are attached at the end of this document.

Volatile organic compounds (including TCE) are currently monitored in Steel Creek at the surface-water stations as part of the annual P-Area Groundwater (PAGW) monitoring program. On the other side of Steel Creek, opposite the PBRP OU, TCE plume exists within the PAGW OU at significantly higher concentrations and is currently impacting surface water within Steel Creek. To understand the impact to Steel Creek, an extensive characterization along Steel Creek was conducted as part of the 2018 PAGW Sampling and Analysis Plan to determine overall area(s) of impact to Steel Creek associated with discharge of VOC contaminated groundwater from the PAGW OU. As

an outcome of the work, it was determined that VOC contaminated groundwater is discharging along a small area opposite the PBRP OU at surface water location SC-03. Surface water monitoring at locations within Steel Creek have been sampled since 2002. Historical monitoring at this station as part of the PAGW OU has shown TCE concentrations to be less than the MCL up until 2004. TCE concentrations at SC-03 have been increasing to above the MCL with the highest reported result of 28.3 ug/L in 2013. The latest reported result (1Q2022) for TCE was 16 ug/L. Additionally, monitoring results for 1,1-DCE indicate this contaminant has not been detected in surface water within Steel Creek.

As part of a corrective action at the PBRP OU, a low permeable soil cover and four Baroball™ wells located in the areas of the highest soil contamination was installed in 2004. The Baroball™ wells met the remedial goal of less than 10 parts per million by volume in 2006. As shown by the attached time-series plot for TCE in well PRP 6 and PRP 7, TCE concentrations have been declining or stable since the completion of the corrective action at the PBRP OU until the increase in concentration above the MCL in 2020. Therefore, the increase in TCE in surface water within Steel Creek can be attributed to the PAGW TCE plume and not from TCE originating at the PBRP OU.

It is unclear whether the current levels of TCE and 1,1-DCE that have been detected within the PBRP OU groundwater will have any future impact on surface water in Steel Creek. 1,1-DCE and 1,4-dioxane surface water data will be used to determine if the current observed groundwater concentrations at PRP 6 are indicative of a plume that is reaching Steel Creek.

Additionally, TCE and 1,1-DCE will continue to be sampled at the Steel Creek surface water locations as part of the PAGW OU. No change to the document is proposed.

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

2. It is unclear whether there is potential for infiltration through the low permeable soil cover and leaching of contaminants to groundwater at the PBRP OU. Figure 7 (PRP 6 Water Elevation vs Concentration Trend Plot) shows concentration values of both TCE and 1,1-DCE increasing slowly after periods of higher water availability in recent years which may indicate leaching of contaminants. Section 3.2.4 (Groundwater Sampling Results at the PBRP OU) states, "the significant increase in 1,1-DCE and TCE concentrations in the last two sampling events may be related to the increased water levels over the last few years;" however, this section does not discuss the potential for leaching of contaminants to be contributing to groundwater contamination. *Please revise the Report to discuss the potential*

of infiltration through the soil cover and leaching of contaminants as the cause of the recent increases and elevated TCE and 1,1- DCE concentrations in groundwater.

Response: Clarification

The increase in TCE and 1,1-DCE concentrations are not believed to be a result of contaminant leaching associated with possible failure of the low permeability cover. Physical inspections of the soil cover have not identified any activities that would compromise the function of the cover system. The soil cover is designed to significantly reduce the rate of infiltration. Additionally, the cover system has a drainage barrier beneath the upper layer of the cover. In the event that water does breach the upper layer of the cover, the water is dispersed away from the pit and emptied into the surrounding runoff ditches. Furthermore, none of the additional CMCOCs were detected during the most recent sampling event. As stated in Section 3.2.4, the increase in concentrations is most likely due to residual VOC mass entrained within pore spaces and/or low permeability zones under the pit that are slowly releasing material as groundwater rises, mobilizing the contaminants. No change to the document is proposed.

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

SPECIFIC COMMENTS

1. **Section 3.2.2, PBRP OU Monitoring Requirements; Page 12 of 36:** The text states that in response to comments received on the 2020 Combined Groundwater Monitoring Report, "SRS has agreed to sample two new surface-water stations, SC-02 and SC-03, for 1-4 [sic] dioxane (Figure 6)"; however, it is not clear if additional monitoring of 1,4-dioxane at surface-water stations has already begun or when 1,4-dioxane will be added to the monitoring plan. In addition, since there is historic data for surface-water stations SC-02 and SC-03, please clarify the reference to "new" (e.g., the stations have been moved or the reference is to a "new" analyte). *Please revise the Report to clarify the planned year for implementing monitoring of 1,4-dioxane and whether the surface-water stations are in a new location or being observed for a "new" analyte.*

Response: Agree with Clarification.

1,4-dioxane is being added as a new analyte to the existing surface water locations SC-02 and SC-03 to be sampled annually. Sampling for 1,4-dioxane is set to occur during the first quarter of 2023 as part of the annual P-Area Groundwater sampling event. Furthermore, for consistency, the additional water elevations will be collected starting in the third quarter of 2022. The text in Section 3.2.2 will be revised in future reports as follows:

> "To better define the extent of contamination at the PBRP OU and to ensure that concentrations sourced from the unit are not adversely affecting Steel Creek, SRS has agreed to sample two ~~new~~ existing surface-water stations, SC-02 and SC-03, for 1,4-dioxane (Figure 6). The additional sampling will be conducted in the first quarter of ~~the year~~2023 during the annual P-Area Groundwater (PAGW) sampling event... will be used to help evaluate the potentiometric surface in the area. All synchronous water elevations will be collected during ~~in~~ the third quarter of the year starting in 2022, during a separate ~~the~~ PAGW synchronous water level sampling event."

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

2. Section 3.2.4, Groundwater Sampling Results at the PBRP OU, Page 13 of 36: This section outlines the additional sampling frequency that would be followed if "1,1-DCE or TCE exceed the recent 2020 maximums" in the 2022 sampling event; however, it is unclear whether an exceedance of the regional screening level (RSL) for 1,4-dioxane would also increase the sampling frequency of wells PRP 6 and PRP 7. All contaminants of interest should include an action-plan for continuous exceedances. *Please revise the Report to include the action-plan should 1,4-dioxane concentrations continue to exceed the RSL.*

Response: Clarification.

An action-plan to increase sampling frequency for 1,1-DCE and TCE was proposed due to the significant increase in contaminant concentrations and only if an increasing trend above the recent 2020 maximum is observed. Additional sampling for 1,4-dioxane at two surface water locations is set to occur during the first quarter of 2023 that will help to determine if any impacts to Steel Creek from the PBRP OU are occurring and also if any

action should be taken in regard to the concentrations of 1,4-dioxane at the PBRP unit. No change to the document is proposed.

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

3. **Section 3.2.4, Groundwater Sampling Results at the PBRP OU, Page 13 of 36:** The report does not consistently identify contaminant migration constituents of concern (CMCOCs). Section 3.2.1 (PBRP OU Background) identifies TCE as a CMCOC and Section 3.2.4 (Groundwater Sampling Results at the PBRP OU) states that TCE exceeded the MCL in 2021; however, the Report later concludes that all CMCOCs were either non-detects or substantially below the MCLs. *Please revise the Report address the discrepancy.*

Response: Agree with Clarification.

TCE was identified as a Human Health RCOC in groundwater and as a CMCOC in soil. The text in section 3.2.4 identifies the remaining CMCOCs (antimony, chromium, copper, nickel, zinc, PCB-1242, and dibenzofuran) that were analyzed, not TCE. For clarity, future text will be revised as follows:

> **"...the remaining CMCOCs (antimony, chromium, copper, nickel, zinc, PCB-1242, and dibenzofuran), excluding PCE and TCE..."**

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

4. **Section 3.2.6, PBRP OU Summary and Conclusions, Page 14 of 36:** The text does not clearly identify the sampling schedule. The text states that surface-water sampling is conducted during the first quarter of the year "during the P Area Groundwater (PAGW) sampling events"; however, the following text states "all water elevations will be collected in the third quarter of the year during the PAGW sampling event." Additionally, it is indicated throughout the text that samples are taken in the fourth quarter. Furthermore, Table B-1 (2021 KBRP Monitoring Data, Page B-5 of B-10) and Table B-2 (2021 PBRP Monitoring Data, Page B-9 of B-10) indicates the groundwater samples and elevation data were collected on October 21, 2021, and November 3, 3021, respectively. *Please revise the text to clarify the noted discrepancies with the sampling schedule.*

Response: Agree with Clarification.

As indicated in the text in Section 3.2.6, the additional wells will be sampled under the PAGW sampling events, not under the PBRP sampling event which occurs in the fourth quarter. The surface water stations will be sampled in the first quarter and the synchronous water elevations will be collected during the third quarter, both during the separate PAGW sampling events. This is being proposed because the PAGW OU already collects synchronous water levels from over 200 wells, including the PBRP OU wells and conducts annual surface water sampling in Steel Creek. To reduce costs and mobilizations, it made sense to leverage a program that is already sampling locations of interest to the PBRP OU, even though the sampling events may not coincide with the 4Q annual sampling event. For clarity the text in Section 3.2.6 will be revised in future reports as follows:

> **"The additional wells will be sampled ~~during~~ under the PAGW OU sampling events. Surface-water sampling ~~at the PAGW OU is~~ will be conducted during the first quarter of the year. ~~and s~~ Synchronous water elevations will be~~are~~ collected during the third quarter of the year will be used to produce the potentiometric surface map for the PBRP OU. SRS will continue to sample and monitor the wells within the PBRP monitoring network during the fourth quarter of the year, and the additional wells identified above, to ensure..."**

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

5. **Appendix B, Groundwater and Surface-Water Monitoring Results (2021), Table B-1, 2021 KBRP Monitoring Data, Page B-5 of B-10:** The table explanation states for Sample KRP 6 flow rate, "Requested to be sampled but was not. See comments as to why not;" however, no comment regarding the reason was found in the Report. Comments should be made on all changes to planned sampling regime. *Please revise the text to include comments on the missing flow rate data for KRP 6.*

Response: Agree with Clarification.

The flow rate for well KRP 6 was not taken because KRP 6 is sampled by HydraSleeve. The table should have indicated an "0" instead of the "NS". Future reports will be revised to indicate the correct flow rate.

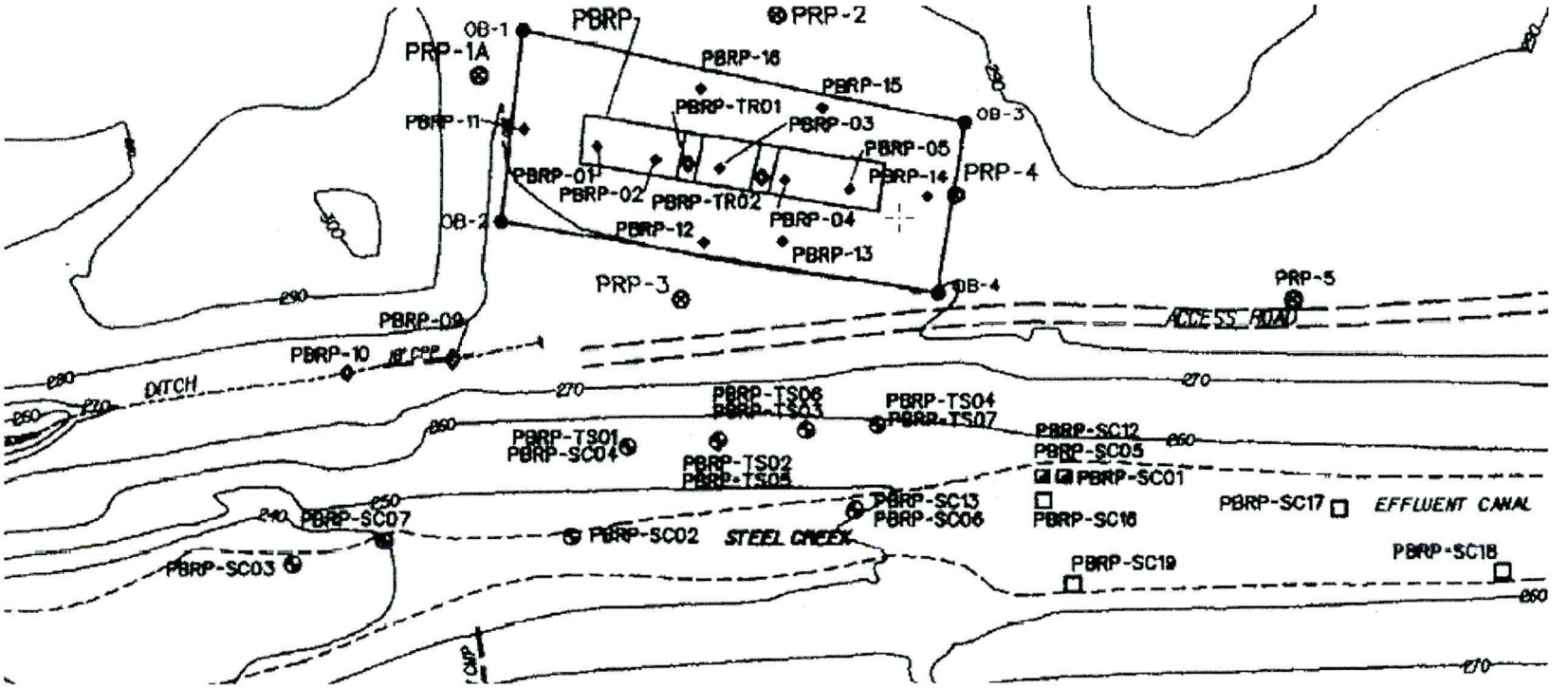
Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

6. **Appendix B, Groundwater and Surface-Water Monitoring Results (2021), Table B-2, 2021 PBRP Monitoring Data, Page B-9 of B-10:** The table contains additional 1,4-dioxane results without explanation for wells PRP 5, PRP 6, and PRP 7. The table lists a second value for 1,4-dioxane, however, no description of this second result is included (e.g., laboratory duplicate, field duplicate). *Please revise the text to include a description of the second 1,4-dioxane result for each well.*

Response: Clarification.

The description of the second result is included in the third paragraph of section 3.2.4. The currently approved method (EPA8260SIM) for analyzing 1,4-dioxane is not capable of achieving a quantitation limit low enough to effectively quantify detections of 1,4-dioxane; therefore, SRS chose to also analyze by method EPA522, which can achieve a quantitation limit below the Regional Screening Limit (RSL). This method is for information only; the approved method was also run. In future reports the table will include a footnote to indicate that a separate method was also used.

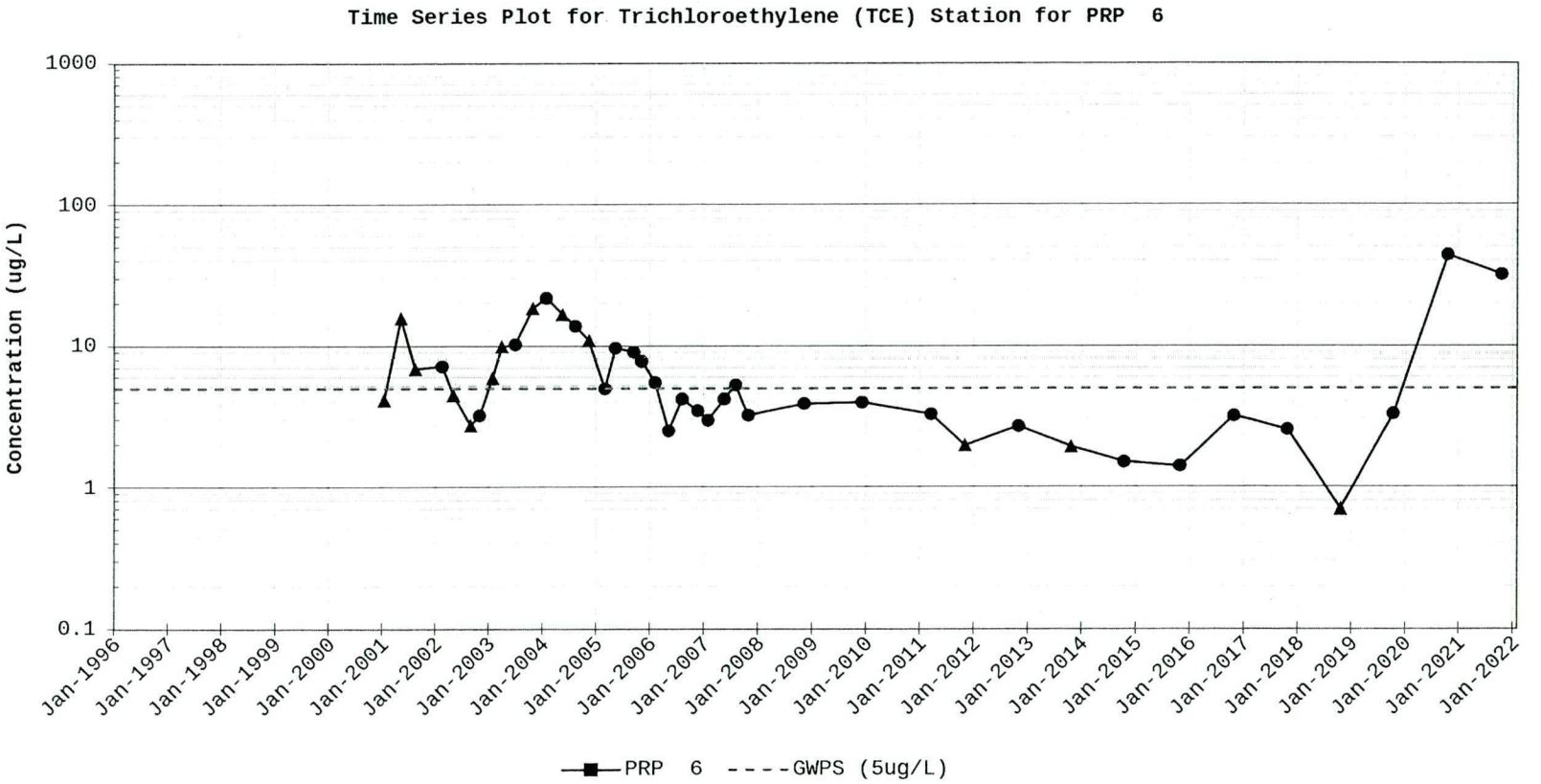
Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

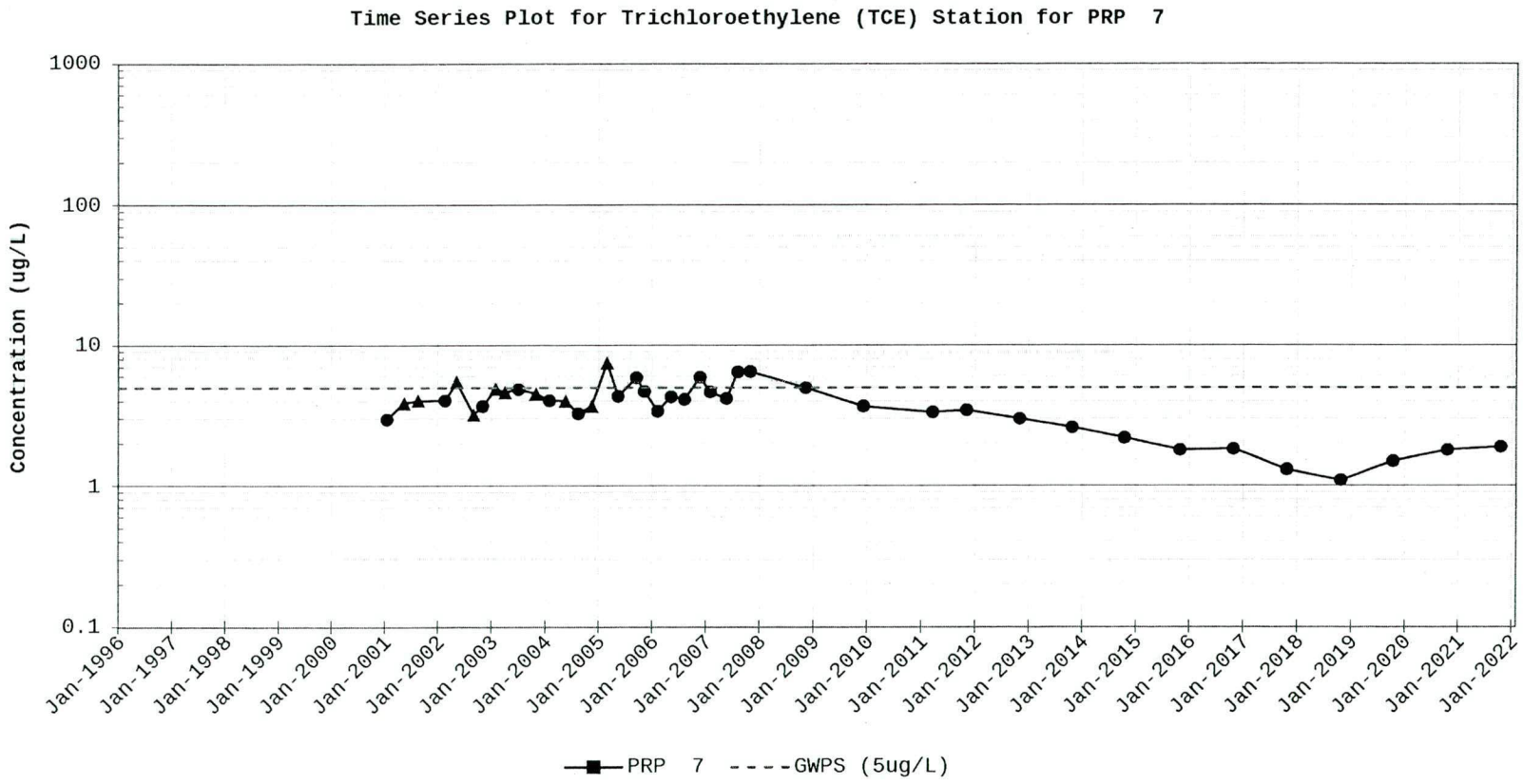


Sampling locations for the PBRP OU during the 1997-1998 RFI/RI investigation (Source: WSRC-RP-98-4174)

1998 TCE Surface Water Sampling Data

STATION NAME	MEDIA	COLLECTION DATE	ANALYTE NAME	PQL	QUALIFIER	RESULT	UNITS
PBRP-SC01	Surface Water	4/20/1998	TRICHLOROETHYLENE (TCE)	5		31	ug/L
PBRP-SC02	Surface Water	4/21/1998	TRICHLOROETHYLENE (TCE)	5		6.54	ug/L
PBRP-SC03	Surface Water	4/21/1998	TRICHLOROETHYLENE (TCE)	5	J	2.72	ug/L
PBRP-TS01	Surface Water	7/28/1998	TRICHLOROETHYLENE (TCE)	5	U	5	ug/L
PBRP-SC16	Surface Water	11/11/1998	TRICHLOROETHYLENE (TCE)	1		56.3	ug/L
PBRP-SC17	Surface Water	11/11/1998	TRICHLOROETHYLENE (TCE)	1		26.9	ug/L
PBRP-SC18	Surface Water	11/11/1998	TRICHLOROETHYLENE (TCE)	1		81.7	ug/L
PBRP-SC19	Surface Water	11/11/1998	TRICHLOROETHYLENE (TCE)	1		67.6	ug/L


Time Series Plot for Trichloroethylene (TCE) Station for PRP 6
Concentration (ug/L)
1000
100
10
1
0.1
Jan-1996
Jan-1997
Jan-1998
Jan-1999
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
PRP 6
GWPS (5ug/L)


Time Series Plot for Trichloroethylene (TCE) Station for PRP 7
Concentration (ug/L)
1000
100
10
1
0.1
Jan-1996
Jan-1997
Jan-1998
Jan-1999
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
PRP 7
GWPS (5ug/L)