Department of Energy
Savannah River Operations Office
P.O. Box A
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FEB - 9 2022

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 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 Biennial Effectiveness Monitoring Report (EMR) for Monitored Natural Attenuation (MNA) at the C-Area Burning/Rubble Pit (131-C) and Old C-Area Burning/Rubble Pit (NBN) Operable Unit (U) January 2019 through December 2020 (SRNS-RP-2021-03749, Revision 0, June 2021) SEMS Number: 31

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 South Carolina Department of Health and Environmental Control's (SCDHEC) approval was received on October 26, 2021 and U. S. Environmental Protection Agency's (EPA) comments were received on November 19, 2021. This report will not be revised; however, all comment responses will be included in the next EMR, as applicable. Please review these responses and provide your approval within thirty (30) days from receipt. The time and effort that the SCDHEC and the EPA have given on the subject operable unit are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-8365, or the DOE Federal Project Director, Ms. Karen Adams, at (803) 952-7871.

Sincerely,

Brian T. Hennessey Digitally signed by Brian T. Hennessey
Date: 2022.02.08 10:57:16 -05'00'

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

IACD-22-125

Enclosure:
SRS Responses to EPA comments on the Biennial Effectiveness Monitoring Report (EMR) for Monitored Natural Attenuation (MNA) at the C-Area Burning/Rubble Pit (131-C) and Old C-Area Burning/Rubble Pit (NBN) Operable Unit (U) January 2019 through December 2020 (SRNS-RP-2021-03749, Revision 0, June 2021) SEMS Number: 31

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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B. A. Cameron, SCDHEC-Aiken Environmental Affairs Office
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R. H. Pope, EPA-Atlanta

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

Comments Received 11/19/2021

GENERAL COMMENTS

1. It is unclear how the groundwater and surface water trichloroethylene (TCE) trigger levels presented in Table 3 (Groundwater and Surface Water TCE Trigger Levels), are adequate to meet the groundwater remedial action objective (RAO) of preventing discharge of contaminated groundwater to surface water resulting in concentrations exceeding their maximum contaminant levels (MCLs). For example, Table 3 lists the TCE trigger level for monitored natural attenuation (MNA) point of compliance (POC) surface water station TL 04 as >5 micrograms per liter (µg/L). However, it is noted if TCE is detected at station TL 04 equal to or greater than the 5 µg/L trigger value, the RAO was not met and the MNA remedy was not adequate to prevent discharge of contaminated groundwater to surface water at concentrations exceeding the MCL. As such, lowering the TL 04 trigger level to a value less than the MCL would be appropriate to ensure the TCE concentrations in surface water do not exceed the MCL trigger level. Alternatively, it may be appropriate to develop trigger levels for MNA monitoring wells (i.e., CRP 50A, CRP 50B, CRP 51A, and CRP 51B) installed in the middle aquifer zone (MAZ) where TCE contaminated groundwater is also discharging into the wetlands of Fourmile Branch (FMB). Currently, TCE trigger levels have not been established for MNA monitoring wells installed within the MAZ located near FMB. *Please revise the EMR for MNA at the C-Area Burning/Rubble Pit (131-C) and Old C-Area Burning/Rubble Pit (CBRP) (NBN) (Biennial Report) to discuss the need to decrease the surface water station TL 04 TCE trigger level or to establish new trigger levels for the MNA MAZ wells at appropriate concentrations to ensure TCE concentrations in the MAZ will not discharge to the surface water at levels exceeding the MCL of 5 µg/L.*

   Response: Clarification.

   In the past 12 years (2009-2020), the maximum VOC concentrations (TCE, Cis-1,2-DCE and VC) at TL-04 have never exceeded the trigger limit. Because the history of TCE results at TL-04 is consistently below the trigger limit, and overall TCE concentrations in the plume are decreasing, SRS recommends retaining the TCE trigger level at => 5 µg/L for TL-04. If a future sample exceeds the trigger level at TL-04, a confirmation sample will be collected for analyses, and the Core Team will be convened to determine a path forward, including if additional monitoring stations need trigger limits. No change is planned for the next EMR.

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

2. It is unclear if biodegradation and complete reductive dechlorination of chlorinated volatile organic compounds (cVOCs) is being inhibited by the relatively low pH levels and high oxidation reduction potential (ORP) results associated with MNA monitoring wells. According to the second paragraph in Section 4.2 (Groundwater Monitoring Well Network), Page 6 of 34, very little biodegradation occurs during transport from the CBRP OU to the points of discharge, and biodegradation is considered to occur only at the wetland areas along

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SPECIFIC COMMENTS

1. **Section 3.2 Hydrogeologic Setting, Page 5 of 34:** It is unclear why the informal nomenclature and sequence of the aquifer zones discussed in this section are not consistent with the aquifer nomenclature and sequence depicted in the cross-section A-A' figures (i.e., Figure 5 [CBRP Plume Cross Section, Fourth Quarter 2000], Figure 6 [CBRP Plume Cross Section, Fourth Quarter 2012] and Figure 7 [CBRP Plume Cross Section, Fourth Quarter 2020]. For example, the cross-sections in Figures 5 through 7 illustrate stratigraphic layers designated as "A-Horizon, AA-Horizon, and Transmissive Zone (TZ)" that are not discussed in this section. Additionally, it is unclear why the MAZ is discussed in the section as one of the three aquifer zones but is not depicted in Figures 5 through 7. *Please revise the Biennial Report to provide discussion of how the A-Horizon, AA-Horizon, and TZ relate to the hydrogeologic setting discussed in this section and why the MAZ is not depicted on cross-sections on Figures 5 through 7.*

   Response: Agree.

   The Upper Aquifer Zone (UAZ) is divided into three horizons: The A-Horizon; the AA-Horizon; and the Transmissive Zone (TZ). At the CBRP OU the A-Horizon and AA-Horizon comprise the vadose zone, and the UAZ consists entirely of the TZ. For clarity, Figures 5-7 will be revised in the next EMR to remove the A-Horizon and AA-Horizon and rename the TZ as the UAZ. The three layers of the TCCZ (Tan Clay Upper Clay, Middle Aquifer Zone and the Tan Clay Lower Clay) will also be clearly labeled on the revised Figures 5-7 (see attached revised Figure 7).

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

2. **Section 4.3 Groundwater Elevation Measurements and Groundwater Flow Direction, Page 7 of 34:** There are several nested monitoring well clusters (e.g., CRW 10, CRP 18, CRP 20, CRP 22 and CRP 51) installed at the CBRP OU; however, the directions of the vertical groundwater gradients observed between the aquifer units (i.e., UAZ, MAZ, LAZ and GA) are not discussed in this section. *Please revise this section to include a discussion of the upward and/or downward directions of vertical gradients observed at nested monitoring well clusters.*

   Response: Clarification.

   The horizontal hydraulic conductivity (Kh) tends to be two orders of magnitude greater than the vertical hydraulic conductivity (Kv), which is why the EMR focuses on the horizontal flow. The "Groundwater Modeling for the C-Area Burning/Rubble Pit (U)" report (WSRC-TR-2001-00298), Hydrogeologic Properties (Section 3.2.2) provides the best evaluation of the horizontal and vertical gradients between each of the units. A paragraph will be added to the end of Section 4.3 similar to the following:

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Likewise, CRW 10C and CRW010CU have higher tritium concentrations, though below the MCL (20 pCi/mL), than the CRP wells. No change to the document is proposed.

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

4. **Figure 5 CBRP Plume Cross Section, Fourth Quarter 2000, Page 27 of 34; Figure 6 CBRP Plume Cross Section, Fourth Quarter 2012, Page 28 of 34; Figure 7 CBRP Plume Cross Section, Fourth Quarter 2020, Page 29 of 34:** The figures include well cluster CRP 51 as the western-most well cluster depicted on the cross section figures (i.e. Figures 5 through 7); however, Figure 3 (CBRP OU LUC Boundary), Page 25 of 35, indicates the western-most well cluster on the A'-A cross section line is CRP 50 (i.e., CRP 50A/B) and not well cluster CRP 51 (i.e., CRP51A/B). A similar issue is noted with the figures in Appendix D (TCE Plume Maps) and Appendix E (Potentiometric Maps) where well cluster CRP 50 (i.e., CRP 50A/B) is depicted as the western-most well located along the A'-A cross section line. *Please revise all the noted figures, as appropriate, to address the discrepancy in which wells are depicted on the cross sections shown on Figures 5 through 7.*

   Response: Clarification/Agree.

   RockWorks software can project either CRP 50 or CRP 51 onto the cross-section line A-A'. CRP 51 was selected to be projected on the cross-section line, as it had the higher TCE concentrations. The cross-section figures (Figures 5-7) will be revised in future EMRs (see attached revised Figure 7) to depict well cluster CRP 50.

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

5. **Appendix E, Figure E-4. 2020 Potentiometric Contours for the Middle Aquifer Zone (MAZ) and Lower Aquifer Zone (UAZ) of the Upper Three Runs Aquifer (UTRA), Page E-6 of E-8**: The Lower Aquifer Zone is incorrectly abbreviated as UAZ in the figure title. *Please revise the figure title to state the correct abbreviation of the Lower Aquifer Zone which is LAZ.*

   Response: Agree.

   The abbreviation "(UAZ)" in the Figure E-4 title will be corrected in the next EMR to "(LAZ)".

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

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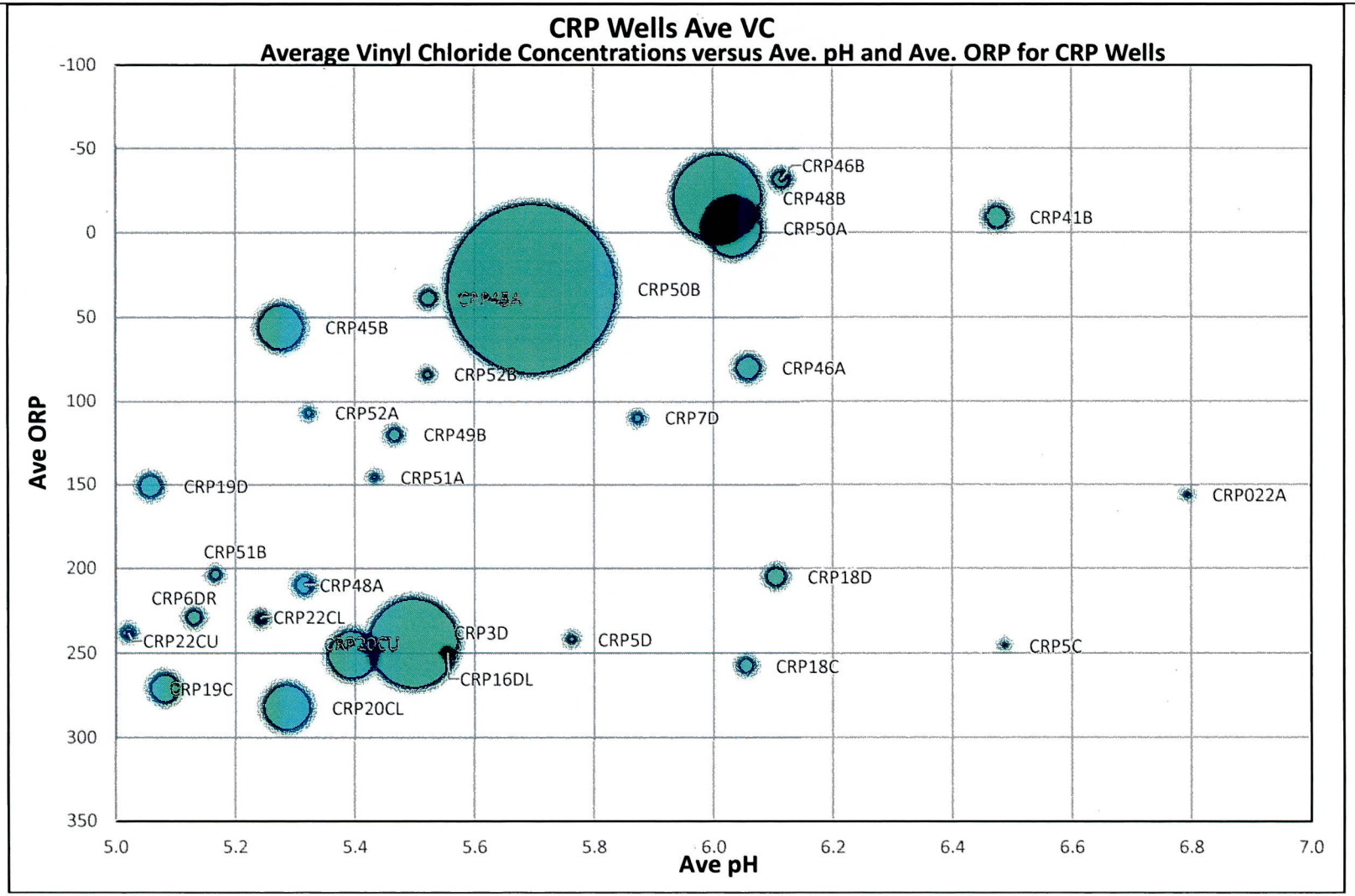

Figure 2

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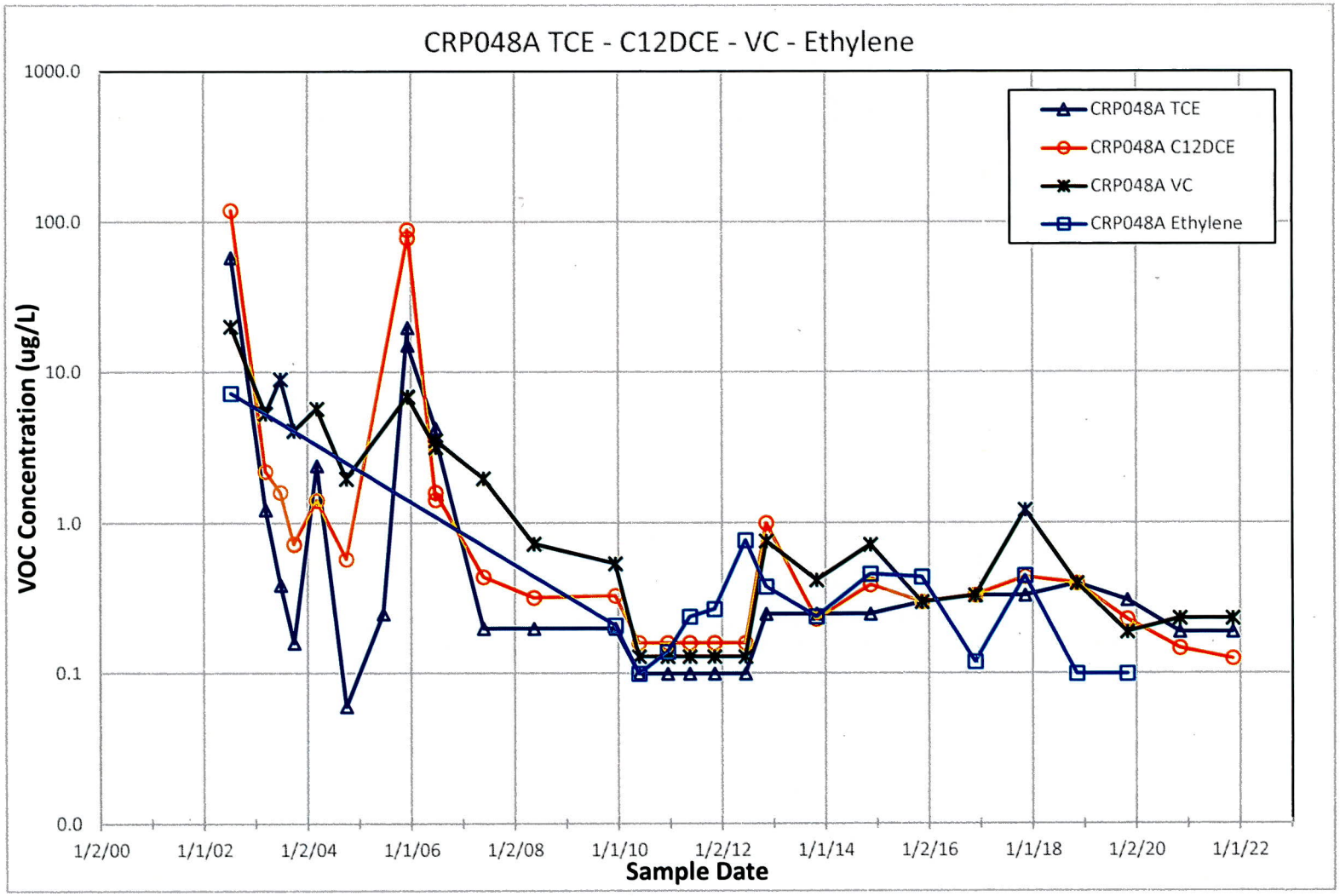

Figure 4

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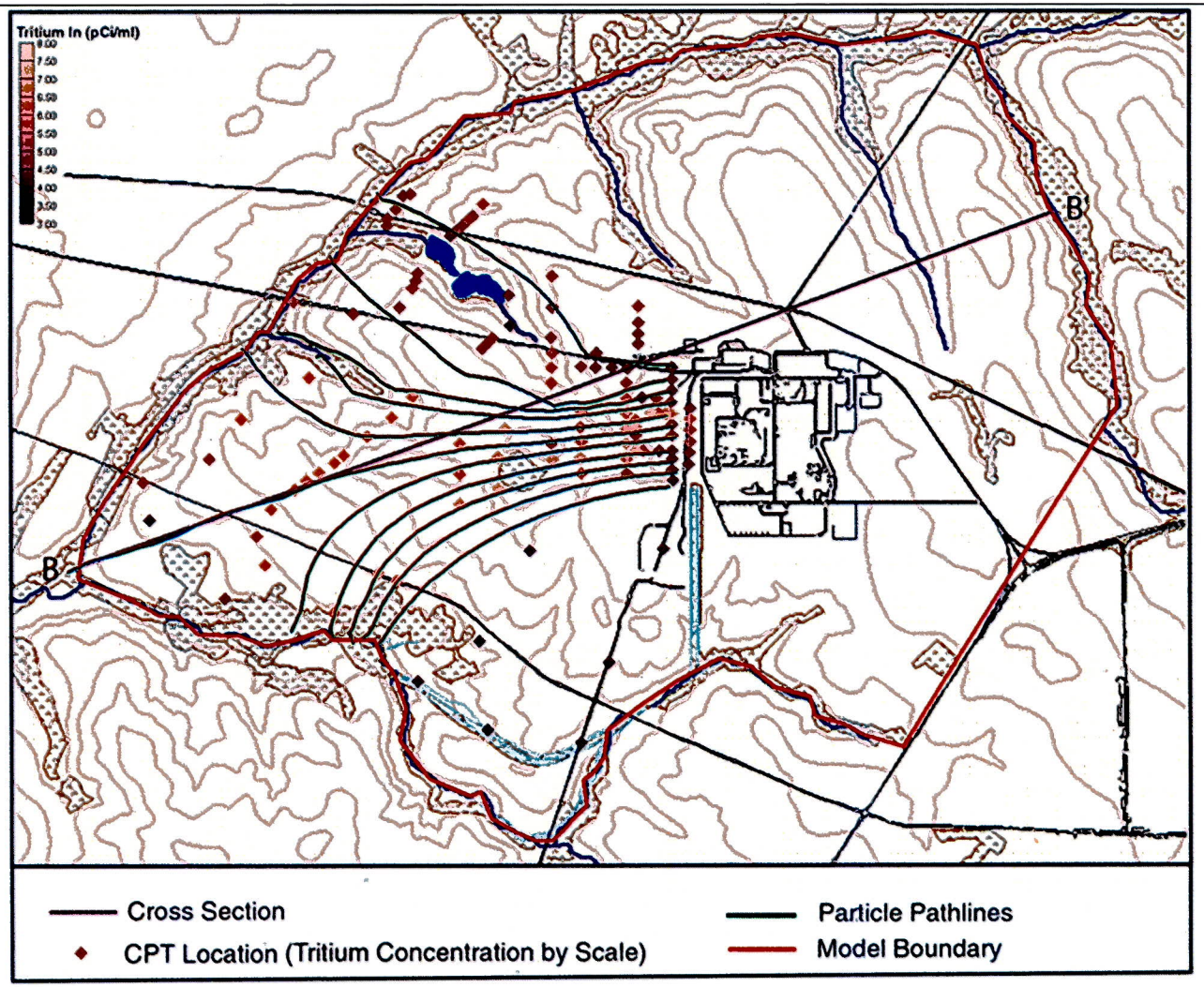

Figure 42. Forward Particle Tracks for Selected Locations near the Reactor Area (WSRC-RP-2000-4096)

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Table 1. Dissolved Oxygen Measurements 2019 - 2021

STATION_ID	SAMPLE_ID	MEASUREMENT_DATE	ANALYTE_NAME	MEASUREMENT_TAKEN	VALUE	UNITS
CRP 18D	CBRP-00000246	10/23/19	OXYGEN	Y	5.36	mg/L
CRP 18D	4Q20CBRP00006	11/2/20	OXYGEN	Y	4.80	mg/L
CRP 18D	CBRP-00000299	10/28/21	OXYGEN	Y	6.10	mg/L
CRP 20CL	CBRP-00000248	11/4/19	OXYGEN	Y	6.89	mg/L
CRP 20CL	4Q20CBRP00008	11/2/20	OXYGEN	Y	9.04	mg/L
CRP 20CL	CBRP-00000308	10/28/21	OXYGEN	Y	3.80	mg/L
CRP 20CU	CBRP-00000249	11/4/19	OXYGEN	Y	6.70	mg/L
CRP 20CU	4Q20CBRP00009	11/2/20	OXYGEN	Y	7.83	mg/L
CRP 20CU	CBRP-00000309	10/28/21	OXYGEN	Y	3.88	mg/L
CRP 22CL	CBRP-00000250	10/23/19	OXYGEN	Y	4.43	mg/L
CRP 22CL	4Q20CBRP00010	11/2/20	OXYGEN	Y	4.40	mg/L
CRP 22CL	CBRP-00000303	10/28/21	OXYGEN	Y	1.95	mg/L
CRP 22CU	CBRP-00000251	10/23/19	OXYGEN	Y	5.65	mg/L
CRP 22CU	4Q20CBRP00011	11/2/20	OXYGEN	Y	5.40	mg/L
CRP 22CU	CBRP-00000282	10/28/21	OXYGEN	Y	5.88	mg/L
CRP 45A	CBRP-00000252	10/29/19	OXYGEN	Y	2.96	mg/L
CRP 45A	4Q20CBRP00012	11/2/20	OXYGEN	Y	5.66	mg/L
CRP 45A	CBRP-00000304	11/9/21	OXYGEN	Y	3.08	mg/L
CRP 45B	CBRP-00000253	10/29/19	OXYGEN	Y	3.10	mg/L
CRP 45B	4Q20CBRP00013	11/2/20	OXYGEN	Y	6.34	mg/L
CRP 45B	CBRP-00000295	11/9/21	OXYGEN	Y	6.48	mg/L
CRP 46A	CBRP-00000254	10/30/19	OXYGEN	Y	11.47	mg/L
CRP 46A	4Q20CBRP00014	11/2/20	OXYGEN	Y	11.20	mg/L
CRP 46A	CBRP-00000288	11/9/21	OXYGEN	Y	2.88	mg/L
CRP 46B	CBRP-00000255	10/30/19	OXYGEN	Y	11.47	mg/L
CRP 46B	4Q20CBRP00015	11/2/20	OXYGEN	Y	4.65	mg/L
CRP 46B	CBRP-00000289	11/9/21	OXYGEN	Y	2.92	mg/L
CRP 48A	CBRP-00000262	10/29/19	OXYGEN	Y	2.92	mg/L
CRP 48A	4Q20CBRP00022	11/2/20	OXYGEN	Y	3.11	mg/L

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Table 1. Dissolved Oxygen Measurements 2019 - 2021

STATION_ID	SAMPLE_ID	MEASUREMENT_DATE	ANALYTE_NAME	MEASUREMENT_TAKEN	VALUE	UNITS
CRP 48A	CBRP-00000276	11/9/21	OXYGEN	Y	5.11	mg/L
CRP 48B	CBRP-00000256	10/29/19	OXYGEN	Y	2.82	mg/L
CRP 48B	4Q20CBRP00016	11/9/20	OXYGEN	Y	1.98	mg/L
CRP 48B	CBRP-00000300	11/9/21	OXYGEN	Y	3.07	mg/L
CRP 50A	CBRP-00000257	10/29/19	OXYGEN	Y	4.10	mg/L
CRP 50A	4Q20CBRP00017	11/9/20	OXYGEN	Y	2.87	mg/L
CRP 50A	CBRP-00000296	11/15/21	OXYGEN	Y	4.98	mg/L
CRP 50B	CBRP-00000258	10/29/19	OXYGEN	Y	2.90	mg/L
CRP 50B	4Q20CBRP00018	11/9/20	OXYGEN	Y	4.01	mg/L
CRP 50B	CBRP-00000290	11/15/21	OXYGEN	Y	3.16	mg/L
CRP 51A	CBRP-00000259	10/30/19	OXYGEN	Y	8.73	mg/L
CRP 51A	CBRP-00000291	11/15/21	OXYGEN	Y	4.07	mg/L
CRP 51B	CBRP-00000260	10/30/19	OXYGEN	Y	8.01	mg/L
CRP 51B	4Q20CBRP00020	11/2/20	OXYGEN	Y	4.66	mg/L
CRP 51B	CBRP-00000297	11/15/21	OXYGEN	Y	3.77	mg/L
CRP 52A	CBRP-00000261	10/29/19	OXYGEN	Y	3.66	mg/L
CRP 52A	4Q20CBRP00021	11/2/20	OXYGEN	Y	10.10	mg/L
CRP 52A	CBRP-00000283	11/15/21	OXYGEN	Y	4.38	mg/L
CRP 52B	CBRP-00000263	10/29/19	OXYGEN	Y	3.87	mg/L
CRP 52B	4Q20CBRP00023	11/2/20	OXYGEN	Y	9.92	mg/L
CRP 52B	CBRP-00000298	11/23/21	OXYGEN	Y	8.20	mg/L
CRP022A	CBRP-00000268	10/23/19	OXYGEN	Y	3.42	mg/L
CRP022A	4Q20CBRP00028	11/2/20	OXYGEN	Y	4.00	mg/L
CRP022A	CBRP-00000306	10/28/21	OXYGEN	Y	3.95	mg/L