



Department of Energy
 Savannah River Operations Office
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FEB -3 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 Effectiveness Monitoring Report (EMR) for the C-Area Groundwater (CAGW) Operable Unit Removal Action (U) July 2020 through June 2021 (SRNS-RP-2021-04758, Revision 0, September 2021) SEMS Number: 82

The U.S. Department of Energy (DOE) is submitting the subject comment responses for your review. The U.S. Environmental Protection Agency's (EPA) comments were received on November 19, 2021 and the South Carolina Department of Health and Environmental Control's (SCDHEC) approval was received on January 24, 2022. 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: 2022.02.02 16:29:41 -05'00'

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

FEB -3 2022

Ms. Susan Fulmer
Mr. Jon Richards

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Enclosure:

SRS Responses to EPA comments on the Effectiveness Monitoring Report (EMR) for the C-Area Groundwater (CAGW) Operable Unit Removal Action (U) July 2020 through June 2021 (SRNS-RP-2021-04758, Revision 0, September 2021) SEMS Number: 82

cc w/o encl:

J. Blalock, SCDHEC-Columbia
S. French, SCDHEC-Columbia
M. Reece, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
T. R. Fuss, SCDHEC-Aiken Environmental Affairs Office
G. O'Quinn, SCDHEC-Aiken Environmental Affairs Office
B. A. Cameron, SCDHEC-Aiken Environmental Affairs Office
K. L. Beatty, SCDHEC-Aiken Environmental Affairs Office
H. L. Herlong, SCDHEC-Aiken Environmental Affairs Office
R. H. Pope, EPA-Atlanta

cc w/encl:

M. McRae, TechLaw, Inc.

Comments Received November 19, 2021

GENERAL COMMENTS

1. The EMR for CAGW Operable Unit Removal Action (U), July 2020 through June 2021, does not present an estimate of trichloroethylene (TCE) mass that has been reduced since the 2019 baseline conditions. The EMR indicates the CAGW OU non-time critical (NTC) removal action objective (RAO) is to protect human health and the environment by reducing the mass of TCE in groundwater. The text further indicates the overall CAGW OU TCE and tritium plumes have decreased in extent and concentration, however, no mass estimates of the TCE reduction in groundwater are provided. *Please revise the EMR to discuss the estimated reduction of TCE mass in groundwater relative the 2019 baseline conditions.*

Response: Clarification

Reductions in plume contaminant mass are inherently difficult to estimate due to the insignificant volume of groundwater sampled as compared to that present in the plume. The estimated plume volume is about 2.2M liters, of which less than one liter combined is sampled from the existing five monitoring wells. As stated in Section 5.0 of the EMR, three of the five wells showed recent decreases in TCE concentrations. TCE concentrations decreased about 50% in the three existing surface water stations of the unnamed tributary to Castor Creek, which represents the groundwater discharge zone of the contaminant plume. SRS recommends using trend data from the wells and surface water stations to qualitatively proxy for TCE mass as quantitative plume mass estimates would be subject to large uncertainties. Text will be added to the 2022 EMR that qualitatively relates the concentration data to TCE mass.

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

2. It is unclear whether petroleum fuel contaminants (e.g., toluene) are present in groundwater that would impact the biodegradation of chlorinated volatile organic compounds (cVOCs). For example, the footnote in Section 4.3.2 (CAGW OU Groundwater Sampling and Analyses), Page 9 of 94, states that “Only well CRW022D samples are analyzed for TPH [total petroleum hydrocarbon] diesel range organics, as it monitors a remediated diesel storage tank site.” Additionally, the text in Section 4.4.1.9 (BioTrap QuantArray-Chlor® Microbial Data), Page 18 of 94, states aerobic (co)metabolic microbial activity is indicated by detectable levels of toluene monooxygenase and toluene monooxygenase 2 on the BioTraps at nearly all monitoring wells. As such, it is unclear whether the detectable levels of toluene monooxygenase and toluene monooxygenase 2 on the BioTraps indicates the presence of toluene in groundwater. *Please revise the EMR to discuss the presence of petroleum fuel contaminants in groundwater and how this condition impacts biodegradation of cVOCs in groundwater.*

Comments Received November 19, 2021

Response: Clarification/Agree

The Upper Aquifer Zone (UAZ) can be split into three zones: The A-Horizon; the AA-Horizon; and the Transmissive Zone (TZ). However, in C-Area the A-Horizon and AA-Horizon comprise the vadose zone, so these two zones of the Upper Aquifer Zone will be removed from Figure 4 in the next EMR. In C-Area, the UAZ consists almost entirely of the TZ, so in Figure 4 the TZ will be renamed as the UAZ in the next EMR. 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 Figure 4 (Attached).

The 3rd paragraph in section 3.2 will be revised in the next EMR as the following:

“The Floridan aquifer system is the aquifer system of concern within the CAGW OU area. The system is divided into two aquifer units separated by a confining unit. From top to bottom, they are known as the UTRA, the Gordon Confining Unit (GCU), and the Gordon Aquifer Unit (GAU). The UTRA occurs between the water table surface and the GCU. The UTRA is divided into three aquifer zones: The Upper Aquifer Zone (UAZ); the Middle Aquifer Zone (MAZ); and the Lower Aquifer Zone (LAZ). ~~The upper UAZ and lower aquifer zones LAZ~~ are divided by an informal aquitard referred to as the “Tan Clay Confining Zone” (TCCZ). ~~The third aquifer zone MAZ resides as a sand to clayey-silty-sand formation zone between the Tan Clay Upper Clay (TCUC) and the Tan Clay Lower Clay (TCLC) layers of within the TCCZ. From top to bottom they are known as the UAZ, MAZ, and the Lower Aquifer Zone (LAZ) of the UTRA (Figure 4).~~ The MAZ is the target of the NTC RA in the distal portion of the TCE plume and consists of a permeable sand to silty-sand in that area. While the hydraulic conductivities vary within each of the aquifer zones, the overall average groundwater velocity is 70 ft/yr for the UTRA between C-Area and the points of discharge along FMB and Castor Creek (WSRC 2001).”

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

2. **Section 4.4 Groundwater and Surface Water Results, Page 10 of 94:** The last paragraph states data from December 2020 show a small area with TCE above 100 micrograms per liter ($\mu\text{g/L}$) near the C-Area Reactor Building; however, the text does not identify the monitoring well with the TCE exceedance. *Please revise the text to state TCE was detected in monitoring well CRW020D at a concentration of 207 $\mu\text{g/L}$ in fourth quarter 2020 (4Q20).*

Response: Agree.

The text in the next EMRs will include the specific wells that exceed the identified threshold.

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

References:

Canada, 2017. *Final Screening Assessment for Pseudomonas putida ATCC 12633, Pseudomonas putida ATCC 31483, Pseudomonas putida ATCC 31800, Pseudomonas putida ATCC 700369*, January 2017, Environment Canada, Health Canada, Government of Canada

Chin, 2012. *VOC composition of current motor fuels and vapors, and collinearity analyses for receptor modeling*, Jo-Yo Chin and Stuart Batterman, March 2012, Chemosphere, 86(9): 951-958.

Morya, 2020. *Burkholderia: An Untapped but Promising Bacterial Genus for the Conversion of Aromatic Compounds*, Raj Morya, et. al., Trends in Biotechnology, September 2020, Vol. 38, No. 9, <https://doi.org/10.1016/j.tibtech.2020.02.008>

Wilson, 2019. *Using qPCR Assays to Predict Rates of Cometabolism of TCE in Aerobic Groundwater*, John Wilson, et.al., Groundwater Monitoring & Remediation, 39, no. 2, Spring 2019, pages 53-63.

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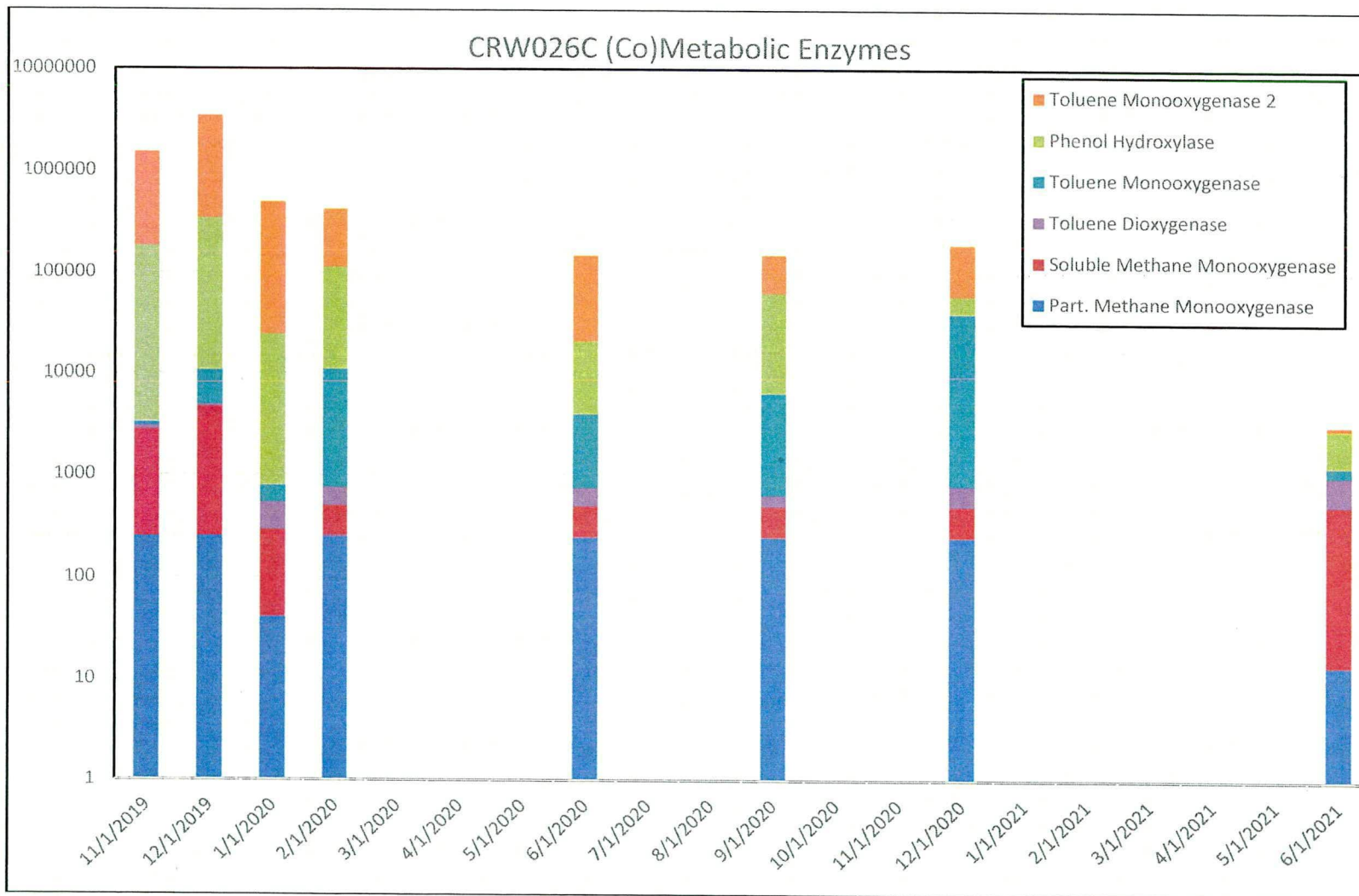


Figure 2. CRW026C (co)metabolic enzyme microbial counts.

SRS Responses to EPA Comments on the Effectiveness Monitoring Report (EMR) For The C-Area Groundwater Operable Unit Removal Action (U) July 2020 Through June 2021 Sems Number: 82, SRNS-RP-2021-04758, Revision 0, September 2021, Savannah River Site, South Carolina

Comments Received November 19, 2021

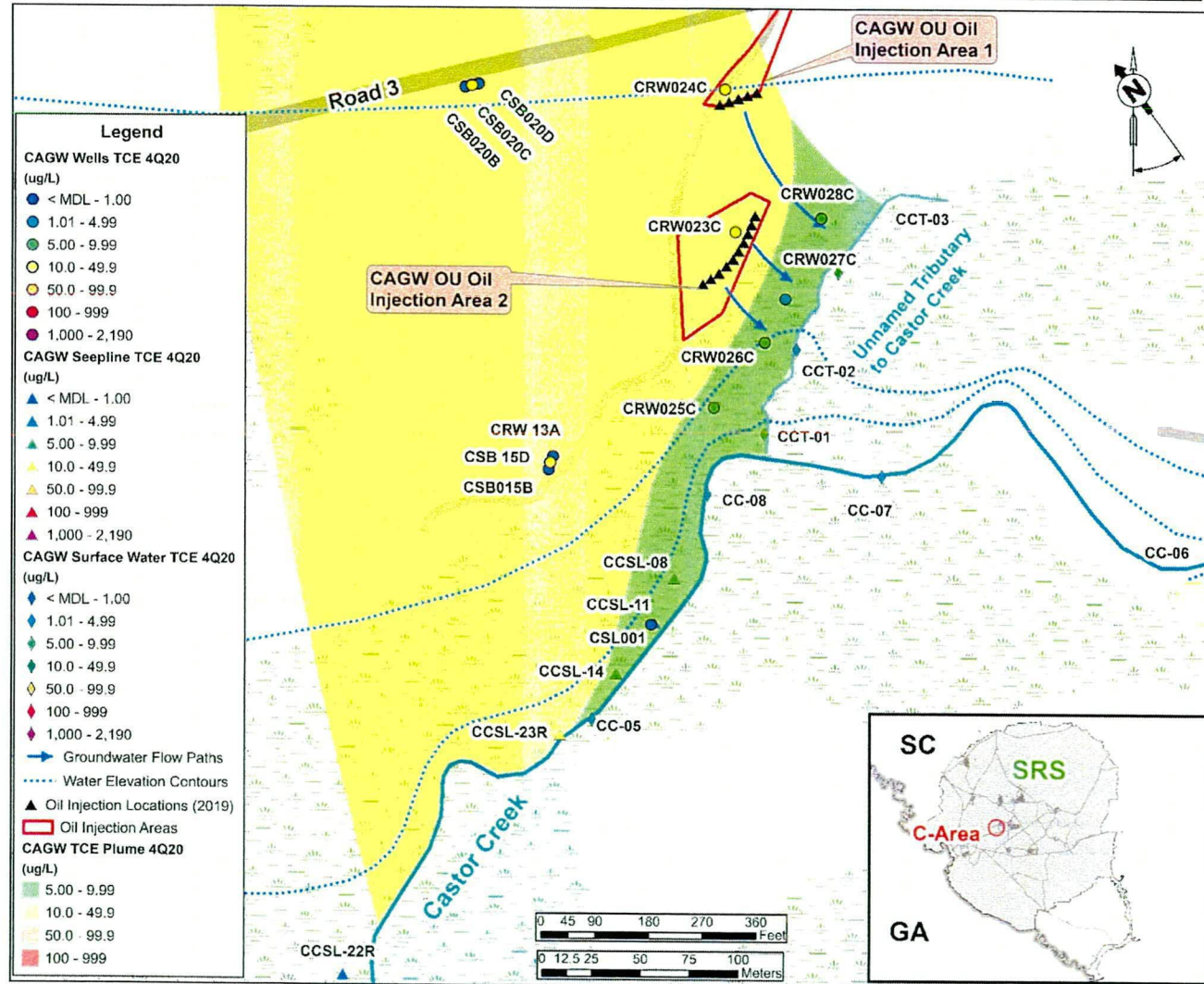


Figure 3B