



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

April 25, 2018

Mr. Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802



RE: EPA Comments on the Draft Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the P-Area Groundwater Operable Unit (U), CERCLIS Number: 81, received March 27, 2018 and comments on the Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for Trichloroethylene Plumes Discharging to Steel Creek in P-Area Groundwater Operable Unit (NBN)(U), CERCLIS Number: 81, SRNS-RP-2017-00372, Revision 1, March 2018, Savannah River Site, South Carolina

Dear Mr. Hennessey,

The U.S. Environmental Protection Agency, Region 4 (EPA), has reviewed the Draft Action Memorandum for the Non-Time Critical Removal Action (NTCRA) for the P-Area Groundwater Operable Unit (U), CERCLIS Number: 81 and also the RSER/EE/CA for P-Area Groundwater Operable Unit (NBN)(U), CERCLIS Number: 81, SRNS-RP-2017-00372, Revision 1. EPA Region 4, Office of Regional Counsel recommends that additional ARARs be included in Appendix A of the RSER/EE/CA that will address all activities identified in the RSER/EE/CA. The recommended ARAR table is attached as a separate document (Table A-1 – Potential ARARs and TBC Criteria for the TCE Plumes Discharging to Steel Creek in PAGW OU). EPA's comments on the Draft Action Memorandum and the RSER/EE/CA for TCE Plumes Discharging to Steel Creek in the PAGW OU, Revision 1 are attached.

If you have any questions or require additional information, please contact me at
(404) 562-8513.

Sincerely,

JENNIFER
TUFTS

Digitally signed by
JENNIFER TUFTS

Date: 2018.04.25
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Jennifer Tufts
Remedial Project Manager
Superfund Division

cc: C.L. Bergren, SRNS-ACP
Susan Fulmer, SCDHEC

Attachment

EPA Comments on the Draft Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the P-Area Groundwater Operable Unit (U), CERCLIS Number: 81, received March 27, 2018 and comments on the Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for Trichloroethylene Plumes Discharging to Steel Creek in P-Area Groundwater Operable Unit (NBN)(U), CERCLIS Number: 81, SRNS-RP-2017-00372, Revision 1, March 2018, Savannah River Site, South Carolina, Savannah River Site, South Carolina

GENERAL COMMENTS

1. The Action Memo and RSER/EE/CA currently state that the remedial action objective (RAO) for the non-time critical removal action is *"to reduce the TCE mass in the groundwater plumes so that the mass flux to Steel Creek will ultimately be reduced to a concentration less than the maximum contaminant level (MCL) (< 5 µg/L) in surface water."* The RAO needs to be revised to reflect the state's promulgated chemical-specific ARARs, i.e., the ambient water quality criteria, for protection of surface water. The RAO should be revised to read: *"The remedial action objective (RAO) for the non-time critical removal action is to reduce the TCE mass in the groundwater plumes so that the mass flux to Steel Creek will ultimately be reduced to a concentration less than the ambient water quality criteria (AWQC) (2.5 µg/L) in surface water."* The numeric criteria for the protection and maintenance of all classes of surface waters are adopted and are listed in SC R. 61-68, sections E, G, and the Appendix attached thereto. According to SC R. 61-68.E.14.b., for application of numeric criteria to protect human health, where separate numeric criteria are given for organism consumption, water and organism consumption (W/O), and drinking water Maximum Contaminant Levels (MCLs), the *most stringent* of the criteria shall be applied to protect the existing and classified uses of the waters of the State. Thus, the RAO, for protection of freshwaters (FW) must meet the following numerical water quality standards as listed in the Appendix:
 - Tetrachloroethylene (PCE) = 0.69 µg/L (W/O)
 - Trichloroethylene (TCE) = 2.5 µg/L (W/O)
 - Cis-1,2-dichloroethylene = 70 µg/L (MCL)
2. Section 2.3- Land Use. Please revise the last sentence to include the AWQC for surface water (based upon protection of human health, W/O). The sentence should read: *"Land use of the entire PAGW OU area will be controlled as part of a future remedial decision in accordance with the SRS Land Use Control Assurance Plan to prevent use of groundwater that exceed MCLs or surface water that exceeds AWQC."*
3. The RSER/EE/CA should indicate that surface water samples will be measured for compliance with the AWQC (TCE, 2.5 µg/L; PCE, 0.69 µg/L; Cis-1,2-dichloroethylene, 70 µg/L) as referenced in comment #1 above. In sections discussing surface water contamination, please include a surface water data summary table and discussion of surface water sampling data in comparison to the AWQC. Currently the document only compares surface water sampling data against the groundwater MCL (5 µg/L).

4. Please replace the ARARs tables in Appendix A of the RSER/EE/CA with the attached ARARs table prepared by the EPA.
5. RSER/EE/CA Section 4.0, for alternatives 2A and 2B, indicates that the method of installation of the PRB will be determined upon review of conceptual designs provided by the vendor, thus it is not yet known whether extensive trenching or excavation will occur. Therefore, the attached ARARs table provided by the EPA includes the requirements for staging piles that may be triggered if installation of the PRB involves trenching and temporary staging of contaminated soils prior to those soils being placed back in the trenched areas.
6. Revise the first sentence on page 13 to state that the objective is to achieve AWQC in Steel Creek. *“Based on data collected from the monitoring well network, it is assumed that four injection campaigns would be required every three years over the course of 10 years in order to sufficiently reduce the mass of TCE in the groundwater in order to be effective at eventually achieving the MCL AWQC in Steel Creek.”*
7. Page 21, alternative 2 – Installation of PRB. Revise discussion of management of soil cuttings to indicate that soil cuttings generated during installation of the PRB will be managed in accordance with all applicable or relevant and appropriate RCRA waste characterization, storage and disposal requirements.
8. Section 6.0 – Preferred Removal Action Alternative. Revise the third sentence to read as follows: *“This alternative will ultimately allow surface water concentrations in Steel Creek to achieve the MCL AWQC once the remnant plumes have attenuated.”*

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Action-specific ARARs							
General Construction Standards — All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)							
Managing storm water runoff from land-disturbing activities	Must comply with the substantive requirements for stormwater management and sediment control of <i>NPDES Construction General (CG) Permit for Stormwater Discharges No. SCR100000, issued under R.122.8 and developed consistent with the conditions in R.61-9.122.41 applicable to all permits.</i>	Large and small construction activities (as defined in R. 61-9 and SCR100000) of more than 1 acre of land – applicable	SCDHEC R. 61-9.122.41 and 122.28(a)(2)(i)	✓	✓	✓	✓
	Coverage under the CG Permit requires development of a stormwater management and sediment control plan which is to be consistent, at a minimum, to the substantive standards listed in SC Regulation 72-300, unless specifically exempted by SC Regulation 72-302.A	Large and small construction activities (as defined in R. 61-9 and SCR100000) of more than 1 acre of land – TBC	<i>NPDES Construction General (CG) Permit for Stormwater Discharges, Permit No. SCR100000</i>	✓	✓	✓	✓
	The stormwater management and sediment control plan shall contain at a minimum the information provided in the following subsections: <ul style="list-style-type: none"> • A plan for temporary and permanent vegetative and structural erosion and sediment control measures which specify the erosion and sediment control measures to be used during all phases of the land disturbing activity and a description of their proposed operation; • Provisions for stormwater runoff control during the land disturbing activity and during the life of the facility meeting the peak discharge rate and velocities requirements in subsections (e)1. and (e)2. of this section. <p>NOTE: Alternative 2B and 3B occur at the elbow area of the TCE Plumes and the land disturbance is estimated to be between 2 and 5 acres. Alternatives 2A and 3A are at the neck area and land disturbance is estimated to be less than 1 acre.</p>	Activities involving more than two (2) acres and less than five (5) acres of actual land disturbance which are not part of a larger common plan of development or sale – applicable	SCDHEC R. 72-307 I(3)(d) and (e) – <i>South Carolina Storm Water Management and Sediment Reduction Regulations</i>		✓		✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Managing fugitive dust emissions from land disturbing activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution. Volatile organic compounds shall not be used for dust control purposes. Oil treatment is also prohibited.	Activities that will generate fugitive particulate matter (Statewide) –applicable	SCDHEC R. 61-62.6 Section III(a)- <i>Control of Fugitive Particulate Matter Statewide</i> SCDHEC R. 61-62.6 Section III(d)	✓	✓	✓	✓
Action-Specific ARARs <i>Underground Injection Well - Installation, Operation and Abandonment</i>							
Injection of fluids, solids, or mixtures into subsurface	No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons.	Underground injection into an underground source of drinking water –applicable.	40 CFR 144.12(a)	✓	✓	✓	✓
	The movement of fluids containing wastes or contaminants into underground sources of drinking water as a result of injection is prohibited if the presence of the waste or contaminant: May cause a violation of any drinking water standard under R61-58.5; or, may otherwise adversely affect the health of persons. As defined in R.61-87.2: “Fluid” means material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state. “Well” means any excavation which is cored, bored, drilled, jetted, dug, or otherwise constructed the depth of which is greater than its largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system.	Underground injection of any fluids into the subsurface or ground waters of the State of South Carolina – applicable.	SCDHEC R.61-87.5(A) and (B)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	No person shall construct, use or operate a Class V.A. well for injection in violation of R61-87.5. R.61-87.11(E)(1) - Class V.A. injection wells include: (g) Injection wells used in experimental technologies	Class V.A injection wells [as classified in R.61-87.11(E)(1)] – applicable	SCDHEC R.61-87.11(E)(2)(b)	✓	✓	✓	✓
Operation of underground injection wells	At a minimum, the following information concerning the injection formation shall be determined or calculated: (1) Fluid pressure; (2) Estimated fracture pressure; (3) Physical and chemical characteristics of the injection zone.	Operation of Class V.A. wells, [as classified in R.61-87.11(E)(1)] – applicable	SCDHEC R.61-87.14(D)	✓	✓	✓	✓
	Shall at all times properly operate and maintain all facilities and systems of treatment and controls which are installed or used.		SCDHEC R.61-87.13(X)	✓	✓	✓	✓
	Shall report malfunction of injection system which may cause fluid migration into or between underground sources of drinking water; shall immediately stop injection upon determination that the injection system has malfunctioned and could cause fluid migration into or between underground sources of drinking water; shall not restart the injection system until the malfunction has been corrected.		SCDHEC R.61-87.13(EE)	✓	✓	✓	✓
Monitoring of underground injection wells	An appropriate number of monitoring wells shall be completed into the injection zone and into any underground sources of drinking water which could be affected by the injection operation. These wells shall be located in such a fashion as to detect any excursion of injection fluids, process by-products, or formation fluids outside the injection area or zone. If the operation may be affected by subsidence or catastrophic collapse the monitoring wells shall be located so that they will not be physically affected.	Monitoring of Class V.A. wells, [as classified in R.61-87.11(E)(1)]– applicable	SCDHEC R.61-87.14(G)(1)	✓	✓	✓	✓
Closure of Class V underground injections wells	Wells must be closed in a manner that complies with the prohibition of fluid movement in 40 CFR 144.82(a)(1). Also, any soil, gravel, sludge, liquids, or other materials removed from or adjacent to the well must be disposed or	Closure of Class V wells [as defined in 40 CFR 144.6(e)] – applicable	40 CFR 144.82(b)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	otherwise managed in accordance with substantive applicable Federal, State, and local regulations and requirements.						
Action-specific ARARs Monitoring Well Installation, Operation, and Abandonment							
Installation of Permanent and Temporary Monitoring Wells	All monitoring wells shall be drilled, constructed, maintained, operated, and/or abandoned to ensure that underground sources of drinking water are not contaminated.	Construction of <i>permanent and temporary</i> monitoring wells, as defined in R. 61-71B – applicable	SCDHEC R. 61-71H.1(b)	✓	✓	✓	✓
Installation of Permanent Conventionally Installed or Direct Push Monitoring Wells	Wells shall be grouted from the top of the bentonite seal to the land surface. Grout is to be composed of neat cement, a bentonite cement mixture, or high solids sodium bentonite grout.	Construction of <i>permanent conventionally installed or direct push</i> monitoring wells, as defined in R. 61-71B – applicable	SCDHEC R. 61-71H.2.a.(1),(2) [<i>conventionally installed wells</i>] SCDHEC R. 61-71H.3.b.(1),(2) [<i>direct push wells</i>]	✓	✓	✓	✓
	The diameter of the annular space shall be large enough to allow for forced injection of grout through a tremie pipe. All grouting shall be accomplished using forced injection to emplace the grout. When emplacing the grouting material, the tremie pipe shall be lowered to the bottom of the zone to be grouted. The tremie pipe shall be kept full continuously from start to finish of the grouting procedure, with the discharge end of the tremie pipe being continuously submerged in the grout until the zone to be grouted is completely filled.		SCDHEC R. 61-71H.2.a.(3),(4) [<i>conventionally installed wells</i>] SCDHEC R. 61-71H.3.b.(3),(4) [<i>direct push wells</i>]	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Installation of Permanent Conventionally Installed or Direct Push Monitoring Wells (cont'd)	A cement or aggregate reinforced concrete pad at the ground surface of appropriate durability and strength, considering the setting and location of each well, that extends six inches beyond the borehole diameter and six inches below ground surface is required. The pad shall be capable of preventing infiltration between the surface casing and the borehole to the subsurface.		SCDHEC R. 61-71H.2.a.(5) [conventionally installed wells] SCDHEC R. 61-71H.3.b.(5) [direct push wells]	✓	✓	✓	✓
	Well Construction and Materials Standards – (1) Casing shall be of sufficient strength to withstand normal forces encountered during and after well installation and be composed of material so as to minimally affect water quality analyses. (2) Casing shall have a sufficient diameter to provide access for sampling equipment. (3) A properly hydrated bentonite seal with a minimum thickness of twelve inches directly above the filter pack shall be used, if the well has a filter pack. (4) The monitoring well intake or screen design shall minimize formation materials from entering the well. The filter pack shall be utilized opposite the well screen as appropriate in so that parameter analyses will be minimally affected. (5) A locking cap or other security devices to prevent damage and/or vandalism shall be used. (6) Monitoring wells completed below grade shall be in a watertight vault with a well cap to prevent infiltration of surface water into the well.	Construction of <i>permanent conventionally installed or direct push</i> monitoring wells, as defined in R. 61-71B – applicable	SCDHEC R. 61-71H.2.b. [conventionally installed wells] SCDHEC R. 61-71H.3.c [direct push wells]	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	All monitoring wells shall be properly labeled with an identification plate immediately upon well completion. The identification plate shall be constructed of a durable, weatherproof, rustproof, material. The identification plate shall be permanently secured to the well casing or enclosure floor around the casing where it is readily visible and shall identify: (1) company name and certification number of the driller who installed the well; (2) date well was completed; (3) total depth (feet); (4) casing depth (feet); (5) screened Interval; (6) designator and/or identification number.		R. 61-71H.2.c. <i>[conventionally installed wells]</i> SCDHEC R. 61-71H.3.d <i>[direct push wells]</i>	✓	✓	✓	✓
Additional Requirements for Installation of <i>Direct Push</i> Monitoring Wells	Direct push wells cannot be installed below a confining layer unless it can be demonstrated to the satisfaction of the Department that cross-contamination of the aquifer systems can be prevented.	Construction of <i>direct push</i> monitoring wells, as defined in R. 61-71B – applicable	R. 61-71H.3.a.	✓	✓	✓	✓
Installation of <i>Temporary</i> Monitoring Wells	Construction and Materials – (1) Casing shall be of sufficient strength to withstand normal forces encountered during and after well installation and be composed of material so as to minimally affect water quality analyses. (2) Casing shall have a sufficient diameter to provide access for sampling equipment. (3) The monitoring well intake or screen design shall minimize formation materials from entering the well. The filter pack or intake shall be utilized opposite the well screen as appropriate so that parameter analyses will be minimally affected.	Construction of <i>temporary</i> monitoring wells, as defined in R. 61-71B – applicable	SCDHEC R. 61-71H.4.a.	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	All temporary monitoring wells shall be sealed with a watertight cap or seal until abandoned. Temporary monitoring wells shall be maintained such that they are not a source or channel of contamination before they are abandoned.	Operation and maintenance of <i>temporary</i> monitoring wells, as defined in R. 61-71B – applicable	SCDHEC R. 61-71H.4.b.	✓	✓	✓	✓
Abandonment of <i>Permanent Conventionally Installed</i> Monitoring Wells	Abandonment of permanent conventionally installed monitoring wells shall be by forced injection of grout or pouring through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. The well shall be filled with either with neat cement, bentonite-cement, or 20% high solids sodium bentonite grout, from the bottom of the well to the land surface.	Abandonment of <i>permanent conventionally installed</i> monitoring wells – applicable	SCDHEC R. 61-71H.2.e.	✓	✓	✓	✓
Abandonment of <i>Permanent Direct Push</i> Monitoring Wells	(1) Permanent direct push wells that do not penetrate a confining layer shall be abandoned by removing all casing from the subsurface and be grouted by forced injection through a tremie pipe from the total depth to the land surface, or by forced injection or pouring of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface. (2) Direct push wells that penetrate a confining layer shall be abandoned by forced injection or pouring of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation.	Abandonment of <i>permanent direct push</i> monitoring wells, as defined in R.61-71B – applicable	SCDHEC R. 61-71H.2.f.	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Abandonment of <i>Temporary Conventionally Installed or Direct Push Monitoring Wells</i>	(1) All temporary monitoring wells shall be abandoned within 5 days of borehole completion. (2) A conventionally drilled temporary well shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. (3) A temporary direct push well that does not penetrate a confining layer shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe after the sampling device has been removed. (4) A temporary direct push well that penetrates a confining layer shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through the sampling device as the sampling device is removed from the sub-surface. Abandonment shall occur during the initial withdrawal from the original push borehole and not by a separate tremie tool after the sampling device has been removed to ensure the breach in the confining layer is permanently sealed.	Abandonment of <i>temporary</i> conventionally installed or direct push monitoring wells, as defined in R.61-71B – applicable	SCDHEC R. 61-71H.4.c.	✓	✓	✓	✓
Action-specific ARARs							
Waste Characterization and Storage (e.g., soil cuttings from well and/or PRB installation, monitoring well purgewater, wastewaters)							
Characterization of solid waste	Must determine if solid waste is a hazardous waste using the following method: Should first determine if waste is excluded from regulation under 40 CFR §261.4; and	Generation of solid waste as defined in 40 CFR §261.2 – applicable	40 CFR §262.11(a) SCDHEC R. 61-79 §262.11(a)	✓	✓	✓	✓
	Must determine if waste is listed as hazardous waste under 40 CFR Part 261.	Generation of solid waste which is not excluded under 40 CFR §261.4(a) – applicable	40 CFR §262.11(b) SCDHEC R. 61-79 §262.11(b)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	<p>Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR Part 261 by either:</p> <p>(1) Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, or according to an equivalent method approved by the Administrator under 40 CFR §260.21; or</p> <p>(2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.</p>	<p>Generation of solid waste which is not excluded under 40 CFR §261.4(a) – applicable</p>	<p>40 CFR §262.11(c) SCDHEC R. 61-79 §262.11(c)</p>	✓	✓	✓	✓
	<p>Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 for possible exclusions or restrictions pertaining to management of the specific waste.</p>	<p>Generation of solid waste which is determined to be hazardous waste – applicable</p>	<p>40 CFR §262.11(d) SCDHEC R. 61-79 §262.11(d)</p>	✓	✓	✓	✓
<p>Determinations for management of hazardous waste</p>	<p>Must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 CFR 268 <i>et seq.</i></p> <p><i>Note:</i> This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.</p>	<p>Generation of hazardous waste for storage, treatment or disposal – applicable</p>	<p>40 CFR 268.9(a) SCDHEC R. 61-79 268.9(a)</p>	✓	✓	✓	✓
	<p>Must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the characteristic waste.</p>	<p>Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal – applicable</p>	<p>40 CFR 268.9(a) SCDHEC R. 61-79 268.9(a)</p>	✓	✓	✓	✓
	<p>Must determine if the hazardous waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use</p>	<p>Generation of hazardous waste for storage, treatment or disposal – applicable</p>	<p>40 CFR 268.7(a) SCDHEC R. 61-79</p>	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt-2A	Alt-2B	Alt-3A	Alt-3B
	of generator knowledge of waste. <i>Note:</i> This determination can be made concurrently with the hazardous waste determination required in 40 CFR 262.11.		268.7(a) (1)				
Temporary storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that: <ul style="list-style-type: none"> waste is placed in containers that comply with 40 CFR 265.171-173; and the date upon which accumulation begins is clearly marked and visible for inspection on each container container is marked with the words “hazardous waste”; or 	Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10 – applicable	40 CFR 262.34(a)(1) and (2) SCDHEC R. 61-79 262.34(a) (1) and (2) 40 CFR 264.34(a)(3) SCDHEC R. 61-79 262.34(a) (3)	✓	✓	✓	✓
	<ul style="list-style-type: none"> container may be marked with other words that identify the contents. 	Accumulation of 55 gal. or less of RCRA hazardous waste or 1 quart of acutely hazardous waste listed in 261.33(e) at or near any point of generation – applicable	40 CFR 262.34(c)(1) SCDHEC R. 61-79 262.34(c) (1)	✓	✓	✓	✓
Use and management of hazardous waste in containers	If container holding waste is not in good condition (e.g. severe rusting, structural defects), or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers – applicable	40 CFR 265.171 SCDHEC R. 61-79 265.171	✓	✓	✓	✓
	Must use a container made or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored, so that the ability of the container to contain the waste is not impaired.		40 CFR 265.172 SCDHEC R. 61-79 265.172	✓	✓	✓	✓
	A container holding hazardous waste must always be closed during storage, except when necessary to add or remove waste.		40 CFR 265.173(a) and (b)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.		SCDHEC R. 61-79 265.173(a) and (b)				
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 CFR 265.175(b).	Storage of RCRA hazardous waste in containers <i>with free liquids</i> – applicable	40 CFR 264.175(a) SCDHEC R. 61-79 264.175(a)	✓	✓	✓	✓
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA-hazardous waste in containers that <i>do not contain free liquids</i> (other than F020, F021, F022, F023, F026 and F027) – applicable	40 CFR 265.175(c)(1) and (2) SCDHEC R. 61-79 265.175(c) (1) and (2)	✓	✓	✓	✓
Closure of RCRA container storage unit	At closure, all hazardous waste and hazardous waste residues must be removed from the containment system. Remaining containers, liners, bases, and soils containing or contaminated with hazardous waste and hazardous waste residues must be decontaminated or removed. [Comment: At closure, as throughout the operating period, unless the owner or operator can demonstrate in accordance with 40 CFR 261.3(d) of this chapter that the solid waste removed from the containment system is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262 through 266 of this chapter].	Storage of RCRA hazardous waste in containers in a unit with a containment system – applicable	40 CFR 264.178	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils/soil cuttings from PRB and cutoff wall installation)	Must be located within the contiguous property under the control of the owner/operator where the wastes are to be managed in the staging pile originated.	Accumulation of non-flowing hazardous remediation waste (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 C.F.R. § 260.10 –applicable	40 C.F.R. § 264.554(a)(1)	✓	✓		
	May be temporarily stored, (including mixing, sizing, blending or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility if used only during remedial operations provided that the staging pile:		40 C.F.R. § 264.554(a)(1)	✓	✓		
	<ul style="list-style-type: none"> must facilitate a reliable, effective and protective remedy; 		40 C.F.R. § 264.554(d)(1)(i)	✓	✓		
	<ul style="list-style-type: none"> must be designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, run-off/run-on controls); and 		40 C.F.R. § 264.554(d)(1)(ii)	✓	✓		
	<ul style="list-style-type: none"> must not operate for more than 2 years, except when an operating term extension under 40 CFR 264.554(i) is granted. <i>Note:</i> Must measure the 2-year limit (or other operating term specified) from first time remediation waste placed in staging pile. <p>Must not use staging pile longer than the length of time designated by EPA in appropriate decision document</p>		40 C.F.R. § 264.554(d)(1)(iii) 40 C.F.R. § 264.554(i)(1)	✓	✓		

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	<p>Extension of up to an additional 180 days beyond the operating term limit may be granted provided the continued operation of the staging pile:</p> <p>Will not pose a threat to human health and the environment; and</p> <p>Is necessary to ensure timely and efficient implementation of remedial actions at the facility.</p>		40 CFR 264.554(i)(1)(i) and (ii)	✓	✓		
	<p>In setting standards and design criteria, must consider the following factors:</p> <p>Length of time pile will be in operation;</p> <p>Volumes of waste you intend to store in the pile;</p> <p>Physical and chemical characteristics of the wastes to be stored in the unit;</p> <p>Potential for releases from the unit;</p> <p>Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and</p> <p>Potential for human and environmental exposure to potential releases from the unit.</p>		40 C.F.R. § 264.554(d)(2)(i)–(vi)	✓	✓		
	<p>Must not place in the same staging pile unless you have complied with 40 C.F.R. § 264.17(b)</p>	<p>Storage of “incompatible” remediation waste (as defined in 40 C.F.R. §260.10) in staging pile in – applicable</p>	40 C.F.R. § 264.554(f)(1)	✓	✓		
	<p>Must separate the incompatible waste or materials, or protect them from on another by using a dike, berm, wall, or other device.</p>	<p>Staging pile of remediation waste stored nearby to incompatible wastes or materials in containers, other piles, open tanks or land disposal units—applicable.</p>	40 C.F.R. § 264.554(f)(2)	✓	✓		

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	Must not pile remediation waste on same base where incompatible wastes or materials were previously piled unless you have sufficiently decontaminated the base to comply with 40 C.F.R. § 264.17(b).		40 C.F.R. §264.554(f)(3)	✓	✓		
Closure of staging piles of remediation waste	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate.	Storage of remediation waste in staging pile in <i>previously contaminated area</i> – applicable	40 C.F.R. §264.554(j)(1)	✓	✓		
	Must decontaminate contaminated sub-soils in a manner that EPA determines will protect human and the environment.		40 C.F.R. §264.554(j)(2)	✓	✓		
	Must be closed within 180 days after the operating term according to 40 C.F.R. §§ 264.258(a) and 264.111, or 265.258(a) and 265.111.	Storage of remediation waste in staging pile in <i>uncontaminated area</i> – applicable	40 C.F.R. §264.554(k)	✓	✓		
Action-specific ARARs							
Waste treatment and disposal — e.g., contaminated soils, wastewaters, monitoring well purge water							
Disposal of solid waste	Shall ultimately dispose of solid waste at facilities and/or sites permitted or registered by the Department for processing or disposal of that waste stream.	Generation of solid waste intended for off-site disposal – relevant and appropriate	SCDHEC R. 61-107.5(D)(3)	✓	✓	✓	✓
Land disposal of RCRA-hazardous waste	May be land disposed if it meets the requirements in the table “Treatment Standards for Hazardous Waste” at § 268.40 before land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA waste – applicable	40 CFR 268.40(a) SCDHEC R. 61-79 §268.40(a)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Land disposal of RCRA-hazardous waste	All underlying hazardous constituents (as defined in 268.2(i)) must meet the Universal Treatment Standards, found in § 268.48, Table Universal Treatment Standards, prior to land disposal as defined in § 268.2(c).	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well – applicable	40 CFR 268.40(e) SCDHEC R. 61-79 §268.40(e)	✓	✓	✓	✓
	Must be treated according to the alternative treatment standards in 268.49(c) <u>or</u> must be treated according to the Universal Treatment Standards (UTS) [specified in 268.48 Table UTS] applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted hazardous <i>soils</i> – applicable	40 CFR 268.49(b) SCDHEC R. 61-79 268.49(b)	✓	✓	✓	✓
	To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards of 40 CFR 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentration in the waste extract or waste, or the generator may use knowledge of the waste. If the waste contains constituents (including UHCs in the characteristic wastes) in excess of the applicable UTS levels in 40 CFR 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.	Land disposal of RCRA toxicity characteristic wastes (D004-D011) that are newly identified (i.e., wastes or soil identified by the TCLP but not the Extraction Procedure) – applicable	40 CFR 268.34(f) SCDHEC R. 61-79 268.34(f)	✓	✓	✓	✓
Disposal of RCRA wastewaters into CWA wastewater	Wastes that are hazardous only because they exhibit a hazardous characteristic, and which are otherwise prohibited under this part, are not prohibited [from land disposal] if the waste meet any of the following criteria, unless the wastes are subject to a specified method of	Restricted RCRA characteristic hazardous wastewaters managed in a wastewater treatment system — applicable	40 CFR §268.1(c)(4) SCDHEC R. 61-79 §268.1(c)(4)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
treatment unit	<p>treatment other than DEACT in §268.40, or are D003 reactive cyanide:</p> <p>(i) The wastes are managed in a treatment system which subsequently discharges to waters of the U.S. pursuant to a permit issued under section 402 of the Clean Water Act [SC R.61-9 and R. 61-68]; or</p> <p>(ii) The wastes are treated for purposes of the pretreatment requirements of section 307 of the Clean Water Act [SC R. 61-9 and R.61-68]; or</p> <p>(iii) The wastes are managed in a zero discharge system engaged in Clean Water Act-equivalent treatment as defined in 268.37(a); and</p> <p>(iv) The wastes no longer exhibit a prohibited characteristic at the point of land disposal (i.e., placement in a surface impoundment).</p>						
Action-specific ARARs							
Transportation of Wastes							
Transportation of hazardous waste <i>on-site</i>	The generator manifesting requirements of §262.20 and §262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in §§263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on public or private right-of-way within or along the border of contiguous property under control of same person – applicable	40 CFR §262.20(f) SCDHEC R. 61-79 §262.20(f)	✓	✓	✓	✓
Transportation of samples (i.e. solid waste, soils and wastewaters)	<p>Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when:</p> <ul style="list-style-type: none"> the sample is being transported to a laboratory for the purpose of testing; or the sample is being transported back to the sample collector after testing. the sample is being stored by sample collector before transport to a lab for testing. 	Samples of solid waste <u>or</u> a sample of water, soil for purpose of conducting testing to determine its characteristics or composition – applicable	40 CFR §261.4(d)(1)(i)-(iii) SCDHEC R. 61-79 §261.4(d) (1)	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
	<p>In order to qualify for the exemption in 40 CFR 261.4 (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must:</p> <ul style="list-style-type: none"> • Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements. • Assure that the information provided in (1) thru (5) of this section accompanies the sample. • Package the sample so that it does not leak, spill, or vaporize from its packaging. 		<p>40 CFR 261.4(d)(2)</p> <p>40 CFR 261.4(d)(2)(ii)(A) and (B)</p> <p>SCDHEC R. 61-79 261.4(d) (2)(ii)(A) and (B)</p>	✓	✓	✓	✓
Chemical-specific ARARs							
Protection of surface water	<p>Freshwaters (FW) are freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses.</p>	<p>Surface waters classified as Class FW (fresh waters) – relevant and appropriate</p>	SC R. 61-68.G.10	✓	✓	✓	✓
	<p>Quality Standards for FW:</p> <p>b. No treated wastes, toxic wastes, deleterious substances, colored or other wastes, alone or in combination with other substances or wastes, in sufficient amounts to make the waters unsafe or unsuitable for primary contact recreation or to impair the waters for any other best usage as determined for the specific waters which are assigned to this class.</p>		SC R. 61-68.G.10.b	✓	✓	✓	✓
	<p>Quality Standards for FW:</p> <p>c. Toxic pollutants listed in the Appendix must meet the standards as prescribed in Section E of this regulation.</p>		SC R. 61-68.G.10.c	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Protection of surface water (cont'd)	<p>All ground waters and surface waters of the State shall at all times, regardless of flow, be free from:</p> <p>(d) High temperature, toxic, corrosive, or deleterious substances attributable to sewage, industrial waste, or other waste in concentrations or combinations which interfere with classified water uses, existing water uses, or which are harmful to human, animal, plant or aquatic life.</p>	Surface waters classified as Class FW (fresh waters) – relevant and appropriate	SC R. 61-68.E.5(d)	✓	✓	✓	✓
	<p>Tests or analytical methods to determine compliance or non-compliance with standards shall be made in accordance with methods and procedures approved by the Department and the EPA.</p> <p>a. Surface water and ground water samples shall be collected so as to permit a realistic appraisal of quality and actual or potential damage to existing or classified water uses. For ground waters, consideration shall be given to, but shall not be limited to, depth to 28 water table, flow direction, and velocity. For surface waters, time of day, flow, surface area, and depth shall be considered.</p> <p>b. Biological assessment methods may be employed in appropriate situations to determine abnormal nutrient enrichment, trophic condition, LC50, concentration of toxic substances, acceptable instream concentrations, or acceptable effluent concentrations for maintenance of a balanced indigenous aquatic community.</p>		SC R. 61-68.E.17	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Protection of surface water (cont'd)	<p>Numeric criteria for the protection and maintenance of all classes of surface waters are adopted and are listed in Sections E, G, and the Appendix.</p> <p>b. Application of numeric criteria to protect human health.</p> <p>(1) If separate numeric criteria are given for organism consumption, water and organism consumption (W/O), and drinking water Maximum Contaminant Levels (MCLs), they shall be applied as appropriate. The <i>most stringent of the criteria shall be applied</i> to protect the existing and classified uses of the waters of the State.</p>	Surface waters classified as Class FW (fresh waters) – relevant and appropriate	SC R. 61-68.E.14.b.	✓	✓	✓	✓
	<p>Numerical water quality standards (maximum permissible levels):</p> <ul style="list-style-type: none"> - Tetrachloroethylene (PCE) = 0.69 µg/L (W/O) - Trichloroethylene (TCE) = 2.5 µg/L (W/O) - Cis-1,2-dichloroethylene = 70 µg/L (MCL) <p>(Note: compound is a degradation product of TCE)</p>		SC R. 61-68. Appendix: Water Quality Criteria for Protection of Aquatic Life and Human Health	✓	✓	✓	✓
	<p>Priority Pollutants 1- 13 (SC R. 61-68 Section G.10.c Appendix)</p> <p>NOTE – These priority pollutants are the list of metals that could leach to the surface stream from the groundwater plumes as a result of lowering the pH in the groundwater plumes due to ISCO injections.</p>		SC R. 61-68. Appendix: Water Quality Criteria for Protection of Aquatic Life and Human Health			✓	✓
Location-specific ARARs							
Discharge of groundwater during well drilling operations	Discharges to the ground must not impact or reach waters of the state.	Discharges of water to the ground that will not reach surface waters – TBC	SRS No Discharge Permit #ND0072125	✓	✓	✓	✓

Table A-1 – Potential ARARs and TBC Criteria for TCE Plumes Discharging to Steel Creek in PAGW OU

Action	Requirements	Prerequisite	Citation	Alt 2A	Alt 2B	Alt 3A	Alt 3B
Protection of Migratory Birds	No person may take, possess, import, export, transport, sell, purchaser, barter or offer for sale, purchase or barter, any migratory bird, or the parts, nests, or eggs of such bird except as under the terms of a valid permit.	Migratory bird populations may be present in the vicinity – applicable	16 USC 703-704 – Migratory Bird Treaty Act	✓	✓	✓	✓

Alt = Alternative

ARAR = applicable or relevant and appropriate requirement

CFR = Code of Federal Regulations

CWA = Clean Water Act of 1972

DEACT = deactivation

DOT = U.S. Department of Transportation

EPA = U.S. Environmental Protection Agency

ISCO = In Situ Chemical Oxidation

LDR = Land Disposal Restrictions

MCL = Maximum Contaminant Level under Safe Drinking Water Act

NPDES = National Pollutant Discharge Elimination System

PRB = Permeable Reactive Barrier

RCRA = Resource Conservation and Recovery Act of 1976

SCDHEC = South Carolina Department of Health and Environmental Control

TBC = to be considered

TCLP = Toxicity Characteristic Leaching Procedure

UTS = Universal Treatment Standard

W/O = Water & Organism