Explanation of Significant Differences

# Para-Chem Southern Superfund Site

Simpsonville, Greenville County, South Carolina
SCD002601656

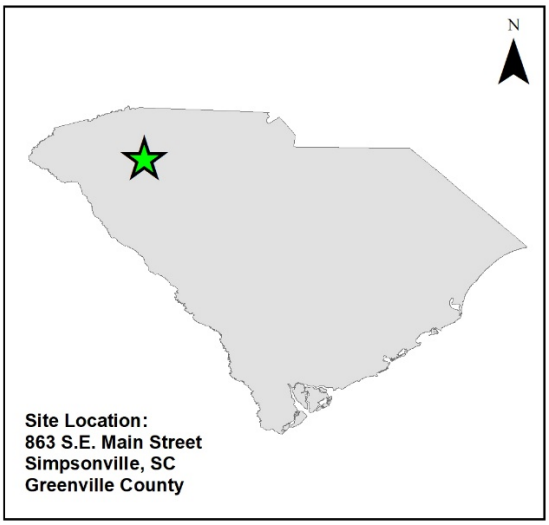
EPA Region 4 August 2019

## INTRODUCTION

This Explanation of Significant Differences (ESD) is being issued for the Para-Chem Southern Superfund Site (Site) located in Simpsonville, Greenville County, South Carolina. This ESD explains changes made by the U.S. Environmental Protection Agency to the remedy for the Site as originally established in the September 27, 1993 Record of Decision (ROD) and amended by the December 23, 1999 ROD Amendment. The EPA is the lead agency for actions taken at the Site and the South Carolina Department of Health and Environmental Control (SCDHEC) is the support agency.

Under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. Section 9617(c) (CERCLA or Superfund), and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Contingency Plan (NCP), and consistent with Office of Solid Waste and Emergency Response Directive 9200.1-23P, EPA is required to issue an ESD when, after issuance of a ROD, a significant, but not fundamental, change is made in either scope, performance, or cost of a selected site remedy. This ESD documents changes to certain components of the remedy set forth in the 1993 ROD and 1999 ROD Amendment for the Site. EPA has determined that the adjustments to the remedy provided in this ESD are significant, but do not fundamentally alter the overall remedy with respect to scope, performance or cost, and therefore, this ESD is properly issued. The Director of the Superfund & Emergency Management Division has been delegated the authority to sign this ESD.

In accordance with Section 117(d) of CERCLA and Section 300.825(a)(2) of the NCP, this ESD




and supporting documents will become part of the Administrative Record for the Site. This ESD and the Administrative Record is available for public review at the following location:

Fountain Inn Public Library, 3111 N. Main Street, Fountain Inn, SC 29644, which is open from 9:00 a.m. to 9:00 p.m. Monday through Thursday, and 9:00 a.m. to 6:00 p.m. Friday and Saturday.

The Administrative Record and other Site-related records are also available for public review at EPA Region 4's office at the following location:

U.S. Environmental Protection Agency
Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Links to this ESD the Administrative Record and other Site-related documents can be found on the EPA website profile page at:
https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0403224

## STATEMENT OF PURPOSE

The purpose of this ESD is to document modifications to the remedy as established in the 1993 ROD and 1999 ROD Amendment.

The major components of the remedy selected in the 1993 ROD included:

- Reduce the mass of contaminants in the source areas by excavation of contaminated sludge and subsurface soil, with verification sampling;
- Biological treatment of sludge;
- Treatability studies, if deemed necessary by the EPA, to evaluate the effectiveness of biological treatment;
- Transportation of the non-biodegradable portions of the sludge and adjacent soils to an approved disposal facility;
- Extraction (recovery) of contaminated groundwater;
- Treatment of contaminated groundwater using air stripping to remove organic contaminants.

The 1993 ROD required the investigation of several areas on the Para-Chem Site. The investigation identified two additional areas of contamination that required remediation: contaminated soil in the H-400 area and contaminated groundwater in the area around MW-22. The 1993 ROD was amended in 1999 to include soil treatment in the H-400 area and expand the groundwater extraction system to address groundwater contamination around MW-22. All other components of the 1993 ROD remained in place. The major components of the modified remedy (1999 ROD Amendment) included:

- A soil vapor extraction (SVE) system to address contaminated soils in the H-400 area;
- Modification of the soil performance standards for the H-400 area; and
- Expansion of the groundwater extraction system to include groundwater recovery in the MW-22 area (south of the original system).

The remedies selected in the 1993 ROD and the 1999 ROD Amendment have been implemented; the groundwater extraction and treatment system continues to operate. A review of system performance indicated that the effectiveness of the groundwater extraction and treatment system could be improved by further reducing the mass of contaminants in the source areas. This ESD incorporates into the Site remedy the following:

- Update groundwater cleanup levels (performance standards) to current Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs); and update risk-based cleanup levels;
- Further reduce the mass of contaminants of concern (COCs) in former source areas using In-Situ Chemical Oxidation (ISCO), in order to enhance the effectiveness of the ongoing groundwater extraction and treatment remedy;
- Change the water treatment component of the remedy from technology-specific (i.e. air stripping) to performance-based. This will allow for changes as treatment technology improves over time; and
- Document a change to the discharge point for treated groundwater.

The modifications enhance the existing remedy but do not change the selected remedy of source control and groundwater extraction and treatment; the remedy remains protective of human health and the environment.

## SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The Site is part of a 140-acre property located in Greenville County, Simpsonville, South Carolina, and includes a currently-operating adhesives manufacturing facility.

Para-Chem operated the facility from 1965 to 2010. Para-Chem produced acrylic polymers, thickeners, latex coatings, and adhesives for a

variety of consumer and industrial applications. On December 13, 2010, Royal Adhesives & Sealants, LLC (Royal) acquired the assets of Para-Chem and continued the manufacture of adhesives. On October 20, 2017, H.B. Fuller Company acquired Royal and continues to operate the manufacturing plant. H.B. Fuller Company is performing all required response actions under CERCLA.

Operations and waste handling practices in the 1960s and 1970s resulted in environmental contamination at the Site. Para-Chem was added to the EPA National Priorities List (NPL) in 1990. Environmental conditions at the time of the 1993 ROD included elevated levels of several volatile organic compounds (VOCs) and inorganic contaminants in subsurface sludge; VOCs and inorganic contaminants in groundwater; and VOCs in the onsite tributary of Big Durbin Creek. Most of this contamination has been addressed in previous actions. Currently, environmental contamination at the Site includes VOCs in groundwater; the groundwater recovery and treatment remedy is ongoing.

The Site has been monitored routinely since the ROD was signed in 1993, including all COCs listed in the 1993 ROD. In June 2012, two additional contaminants (1,4-dioxane and vinyl chloride) were added to the groundwater monitoring program. 1,4-dioxane is associated with solvents used in the past, and vinyl chloride is a breakdown product of other COCs. Some of the COCs from the 1993 ROD continue to persist at the Site, though many have not been detected above the cleanup or background levels during the past five years. Monitoring data demonstrates that 1,4-dioxane in groundwater exceeds health-based cleanup levels. In the past five years, vinyl chloride has not been detected in groundwater above the MCL. This ESD modifies the original list of COCs, as outlined in the 1993 ROD, to add one additional COC: 1,4-dioxane.

As documented in the revised 2018 Performance Monitoring Report and ISCO Pilot Test Completion Report (July 2019), Site contaminants exceeding groundwater cleanup levels include: 1,1-dichloroethane; 1,1-dichloroethene; 1,2-dichloroethane, cis-1,2-dichloroethene, 1,4-dioxane; tetrachloroethene; 1,1,2-trichlorethane; 1,1,1-trichloroethane; and trichloroethene. A summary of the most recent sampling events shows:

- All COCs are below current site cleanup standards in 15 of the 30 sentry monitoring wells;
- All COCs are below current site cleanup standards in all six (6) surface water sampling locations, indicating that the existing remedy is effectively maintaining hydraulic containment along the down gradient border of the Site; and
- A downward (improving) trend in the majority of Site monitoring wells, indicating that the plume continues to shrink inward and the mass of COCs is reducing.

In 1987, prior to inclusion of the Site on the NPL in 1990, approximately 3,000 tons of drums, waste, soil, and debris were removed from four former waste burial areas. The 1993 ROD required excavation of contaminated sludge and subsurface soil with subsequent biological treatment or transportation to a waste disposal facility of the excavated material; extraction of contaminated groundwater; and treatment of contaminated groundwater using air stripping to remove organic contaminants, with additional treatment as necessary, for discharge to a local publicly owned treatment works (POTW). Pursuant to the ROD, removal of additional contaminated sludges/soils from the lagoon and settling basin area was completed in 1996. Biological treatment of the removed sludge was not performed. The contaminated materials were disposed at an appropriate off-site facility. In response to groundwater contamination, an initial groundwater extraction and treatment system was installed in the late 1980s. The above-ground treatment system consisted of treating the extracted water in an air stripper to remove VOCs. The groundwater extraction and treatment system was expanded from 1986 through 1994 to

comply with the ROD. Additional extraction wells were added from 1995 to 1997 to enhance the system.

The 1999 ROD Amendment required an SVE system to address contaminated soils in the H-400 area; modification of the soil performance standards for the H-400 area; and expansion of the groundwater recovery system to include groundwater recovery and treatment surrounding the MW-22 area. The SVE system required under the 1999 ROD Amendment was installed in early 2000 and was started on July 24, 2000. Operation continued for approximately 10 months and terminated on May 18, 2001 because the system met the soil cleanup levels (called "performance standards") established in the ROD Amendment.

The 1999 ROD Amendment also required installation of groundwater extraction wells within the MW-22 area; the wells were installed in 2000. Additional extraction wells were installed in 2001 to address concerns of plume migration at the northern limits of the extraction system.

Currently, there are 20 groundwater recovery wells operating, extracting approximately 53,000 gallons of groundwater per day, or about 19 million gallons per year. The recovery system is designed to reduce contaminant concentrations and prevent contaminated groundwater from migrating off-site. Recovered water is treated to remove contaminants using air stripping and chemical oxidation treatment technologies. After treatment, the water is tested to ensure it meets the groundwater cleanup levels prior to discharge.

Pursuant to the 1993 ROD, treated water was discharged to the local publicly-owned treatment works (POTW). In 1995, with the approval of the SCDHEC and the EPA, the discharge point for treated water was changed from the POTW to an onsite pond and, from there, to an intermittent stream (unnamed tributary of Durbin Creek) under a National Pollution Discharge Elimination System (NPDES) permit. In 2014, water from the pond was hard-piped to the unnamed tributary of Durbin Creek. This ESD modifies the remedy to include discharge of clean, treated water to the unnamed tributary, in compliance with the NPDES permit, rather than the local POTW.

From 2012 to 2015, several improvements were made to the remediation system including addition of a submersible pump, motor, instrumentation, drive, controller, flow meter and pressure transducer for each recovery well. Other improvements included an automated monitoring system, addition of a chemical oxidation process to the existing water treatment system, and excavation of additional source material (contaminated soil). ISCO bench testing (2014) and field testing (2017-2019) was conducted to determine the efficacy of ISCO as an enhancement to the existing remedy; specifically, whether ISCO can reduce the mass of COCs in former source areas.

The soils above groundwater in former Waste Burial Area No. 1, located in the northwestern corner of the Site, were delisted by the EPA, Region 4 in 1997, removing them from the Site.

## APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Compliance with ARARs

Section 121(d) of CERCLA, as amended, specifies in part, that remedial actions for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs) to the hazardous substances or particular circumstances at a site unless such ARAR(s) are waived under CERCLA Section 121(d) (4). See also 40 C.F.R. § 300.430(f)(1)(ii)(B). The ARARs are included in Appendix A.

Action-specific ARARs are usually technology-based or activity-based requirements or limitations that control actions taken at hazardous waste sites and include performance, design and controls, or restrictions on particular kinds of activities related to management of hazardous

substances. **Table A-1** lists the Action-Specific ARARs for the remedy changes being implemented under this ESD. The EPA expects that the cleanup activities under this ESD will comply with the substantive requirements of Federal and South Carolina regulations for injections into underground sources of drinking water (i.e., UIC regulations for Class V injection wells), and for discharges of treated wastewater to surface water (i.e., NPDES requirements).

Chemical-Specific ARARs are usually health or risk based numerical values limiting the amount or concentration of a chemical that may be found in, or discharged to, the environment. The Safe Drinking Water Act MCLs at 40 C.F.R. Part 141 and the State Primary Drinking Water Regulations at SCDHEC R. 61-58 are Chemical-Specific ARARs used to establish remediation levels for restoration of site groundwater, which is classified Class GB, a potential drinking water source, under SCDHEC R. 61-68H.9. In addition, discharges of treated wastewater to surface water must comply with SCDHEC R. 61-68E (degree of treatment of effluents discharged into waters of the State). **Table A-2** lists Chemical-Specific ARARs for the facility, which includes MCLs for some of the groundwater COCs. In the absence of an MCL or other Chemical-Specific ARAR, site-specific risk-based remedial goals were developed for the groundwater COCs and are shown on Table 1 below.

## BASIS FOR THE ESD AND DESCRIPTION OF SIGNIFICANT DIFFERENCES

Currently, the remedy at the Para-Chem Site is protective of human health and the environment because highly contaminated sludge and soil were excavated and properly disposed off-site; groundwater extraction effectively prevents migration of contaminated groundwater and reduces contaminant concentrations in groundwater; and institutional controls have been implemented to restrict groundwater use and limit site access.

However, to enhance the performance of the groundwater extraction and treatment remedy, and for the remedy to be protective over the long term, the EPA is making the following modifications to the remedy:

<u>Update Groundwater Cleanup Levels and Revise List of Site Groundwater COCs (Table 1)</u>

- Update the groundwater cleanup levels (performance standards) to reflect current MCLs or risk-based cleanup goals, as several of the original cleanup goals are out of date;
- Revise the list of Site COCs to include 1,4-dioxane and establish a groundwater cleanup level for 1,4-dioxane. 1,4-dioxane is associated with past operations, is present in groundwater above the human health risk-based cleanup level, is regularly monitored at the Site, and is treated in the on-site water treatment plant;
- Add a groundwater cleanup level for Tetrahydrofuran (THF). THF was identified as a COC in the 1993 ROD, however, no toxicity value was available at the time of the ROD, and no groundwater cleanup level was established. Since the issuance of the 1993 ROD, a toxicity value for THF has been established, and, through this ESD, EPA is adding a groundwater cleanup level for THF.
- Revise the list of Site COCs to replace total 1,2-dichloroethene with cis-1,2-dichloroethene and trans-1-2-dichloroethene.

Table 1 presents a revised list of COCs and updated cleanup levels. The table presents the COCs and cleanup levels from the original 1993 ROD, and the updated COCs and cleanup levels documented in this ESD.

## Table 1. Revised List of Chemicals of Concern and Cleanup Levels for Groundwater

| Chemical of Concern (COC) | 1993 ROD Cleanup Levels (mg/L) | Updated Cleanup Levels (mg/L) | Source |
|---|---|---|---|
| **Organics** | | | |
| Acetone* | 0.52 | 26 | Risk-based[1,2] |
| Benzene* | 0.005 | 0.005 | MCL |
| 2-Butanone (MEK)* | 0.60 | 13 | Risk-based[1,2] |
| Chloroform* | 0.0005 | 0.07 | MCLG[3] |
| 1,1-Dichloroethane | 0.78 | 0.07 | Risk-based[1,2] |
| 1,2-Dichloroethane | 0.005 | 0.005 | MCL |
| 1,1-Dichloroethene | 0.007 | 0.007 | MCL |
| cis-1,2-Dichloroethene | -- | 0.07 | MCL |
| trans-1,2-Dichloroethene* | -- | 0.1 | MCL |
| Methylene Chloride* | 0.005 | 0.005 | MCL |
| Toluene* | 1 | 1 | MCL |
| 1,1,1-Trichloroethane | 0.2 | 0.2 | MCL |
| 1,1,2-Trichloroethane | 0.003 | 0.005 | MCL |
| Trichloroethene | 0.005 | 0.005 | MCL |
| Tetrachloroethene | 0.005 | 0.005 | MCL |
| Xylenes* | 10 | 0.7 | Risk- based[1,2,5] |
| Tetrahydrofuran (THF)* | -- | 8 | Risk- based[2] |
| 1,4-Dioxane | -- | 0.01 | Risk-based[1,4] |
| **Inorganics** | | | |
| Aluminum | 0.05 | 32 | Risk-based[1] |
| Arsenic* | 0.05 | 0.01 | MCL |
| Manganese | 0.05 | 0.7 | Risk- based[1] |
| Zinc* | 5 | 9.6 | Risk- based[1] |

Notes:

* Groundwater cleanup levels have been achieved for the following constituents, as documented in the 2018 Performance Monitoring Report: Acetone, Benzene, 2-Butanone, Chloroform, trans-1,2-Dichloroethene, Methylene Chloride, Toluene, Xylenes, THF, Arsenic, and Zinc.

[1] Calculated to protect resident based on chronic daily exposure (child + adult), at a carcinogenic risk of 10-5 (1,1-Dichloroethane and 1,4-Dioxane), and a noncarcinogenic hazard quotient (HQ) of less than or equal to 1 (all contaminants).

[2] Adjusted water-to-air volatilization factor (for volatile contaminants) from the Regional Screening Level (RSL) calculator default, per EPA Region 4 supplemental risk assessment guidance.

[3] Maximum Contaminant Level Goal (MCLG) is health protective specifically for Chloroform, whereas the Maximum Contaminant Level (MCL) is for total Trihalomethane compounds.

[4] Cleanup level previously proposed by PRP consultant and agreed to by EPA; remains health protective (within risk range for cancer and noncancer) based on current exposure inputs and toxicity values. (Risk Considerations and Proposed Performance Standard for 1,4-Dioxane in Groundwater at the Para-Chem Site, February 2012.)

[5] The MCL for Xylenes is no longer health protective based on the current EPA Toxicity Assessment (IRIS).

MCL = Safe Drinking Water Act (SDWA) Maximum Contaminant Level.

Remedy Enhancements

The 1993 ROD and 1999 ROD Amendment established that the overall cleanup approach of source control and groundwater extraction and treatment. The source control components of the 1993 ROD and 1999 ROD Amendment addressed unsaturated soil that contained COCs at levels high enough to leach into groundwater and cause groundwater contamination above drinking water standards. The soil and sludge excavation specified in the 1993 ROD is complete, and SVE specified in the 1999 AROD is complete. Groundwater extraction and treatment is on-going.

Although prior cleanup actions have addressed contaminated soil in the unsaturated zone, COCs remain in saturated subsurface soil. Contaminated media in the saturated zone in the former source areas may continue to leach contaminants to the groundwater.

- This ESD enhances the existing remedy with the addition of ISCO to reduce COC mass in former source areas, specifically in the saturated zone that was not addressed in previous actions. Reducing the mass of sorbed contaminants in the saturated zone will improve the effectiveness of the groundwater remedy by reducing the COC burden on the groundwater extraction and treatment system. In 2014 a treatability study was performed to evaluate Advanced Oxidation Processes (AOPs). Based on the results of the bench scale treatability testing, ozone and hydrogen peroxide were identified as potentially effective in destroying recalcitrant VOCs in the subsurface (Technical Memorandum Bench Scale AOP Study revised January 6, 2015, Pace Engineering). The bench test results recommended field testing. Pilot (field) testing at the Site began in 2015 and was expanded to two additional areas in 2016 and 2017. Pilot testing is now complete, and this ESD incorporates ISCO into the Site remedy. Pilot test results are documented in the revised 2018 Performance Monitoring Report and ISCO Pilot Test Completion Report (July 2019).

- As part of the selected remedy, extracted groundwater is treated to meet groundwater cleanup levels (performance standards). The 1993 ROD specified groundwater treatment by air stripping. Over time, air stripping alone was found to be insufficient to meet risk-based performance standards for 1,4-dioxane, and, in April 2013, chemical oxidation was added to the treatment train to supplement air stripping (specifically, chemical oxidation was added to treat 1,4-dioxane). Currently, a more effective and efficient technology, UV oxidation, is available, in conjunction with air stripping to treat extracted groundwater. Other technologies may become available in the future. This ESD changes the treatment component of the remedy to a performance-based standard rather than specify a particular technology. Recovered groundwater must be treated to comply with groundwater performance standards, which are the same as the groundwater cleanup levels.

Modify Discharge Point for Treated Water

The 1993 ROD specified that treated water is discharged to the Western Carolina Regional Sewer Authority (the local POTW); however, treated water is ultimately discharged to an intermittent stream (unnamed tributary of Durbin Creek) under NPDES Permit #SC0047589. Treated groundwater meets all the performance standards for groundwater and drinking water under the Safe Drinking Water Act and complies with the requirements of the NPDES permit for surface water discharge. This ESD documents the change.

**FIVE-YEAR REVIEWS**

This remedy results in hazardous substances, pollutants, or contaminants remaining onsite

above levels that allow for unlimited use and unrestricted exposure. To date, three Five-Year Reviews have been conducted at the Site; the next Five-Year Review will be conducted on or before September 2020 to ensure that the remedy is, or will be, protective of human health and the environment.

## STATUTORY DETERMINATIONS

The EPA has determined that these changes comply with the statutory requirements of CERCLA Section 121, 42 U.S.C. Section 9621 and NCP Section 300.430(f)(1)(ii), are protective of human health and the environment and comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action. The modified remedy is technically feasible, cost effective, and meets the remedial action objectives specified in the 1993 ROD. The modified remedy satisfies the statutory requirements of CERCLA § 121 by providing for a remedial action that includes treatment as a principal element and therefore permanently and significantly reduces the toxicity, mobility, and volume of hazardous substances.

## PUBLIC PARTICIPATION

The public participation requirements set out in the NCP, 40 CFR § 300.435(c)(2), have been met by publishing this ESD, making it available to the public in the Administrative Record, and publishing a notice summarizing the ESD in a major local newspaper.

For further information about this ESD, contact:

Cathy Amoroso
Remedial Project Manager
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303

Telephone: 404-562-8637
e-mail: Amoroso.cathy@epa.gov

Or

Kyle Bryant
U.S. Environmental Protection Agency
Community Involvement Coordinator
61 Forsyth Street, SW
Atlanta, Georgia 30307

Telephone: 404-562-9073
e-mail: Bryant.kyle@epa.gov

## SUPPORT AGENCY COMMENTS

EPA is issuing this ESD after consultation with the SCDHEC in accordance with NCP, 40 CFR § 300.435(c)(2) and §300.435(c)(2)(i) and CERCLA § 121(f). The SCDHEC concurred with this ESD in a letter dated May 7, 2019.

## AUTHORIZING SIGNATURE

I have determined the remedy for the Site, as modified by this ESD, is protective of human health and the environment, and will remain so provided the actions presented in this report are implemented as described above.

This ESD documents the significant changes related to the remedy at the Site. The EPA selected these changes after consultation with SCDHEC.

U.S. Environmental Protection Agency

By:

Franklin E. Hill, Director
Superfund & Emergency Management Division

Date: 8/6/19

# APPENDIX A

## APPLICABLE OR RELEVANT AND APPRORIATE REQUIREMENTS

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| ***Underground Injection Control Requirements (e.g., injection of reagents or surfactants during ISCO)*** | | | |
| 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. | Class V wells [as defined in 40 CFR 144.6(e)] used in experimental technologies to inject reagents into underground source of drinking water – **applicable**. | 40 CFR 144.82(a)(1)<br>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:<br>• May cause a violation of any drinking water standard under R61-58.5; or,<br>• May otherwise adversely affect the health of persons.<br>As defined in R.61-87.2:<br>‘‘Fluid’’ means material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state. | Underground injection of any fluids into the subsurface or ground waters of the State of South Carolina – **applicable**. | SCDHEC R.61-87.5 |
| | No person shall construct, use or operate a Class V.A. well for injection in violation of R61-87.5. | Class V.A injection wells used in experimental technologies [as classified in R.61-87.11(E)(1)(g)]– **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:<br>(1) Fluid pressure;<br>(2) Estimated fracture pressure;<br>(3) Physical and chemical characteristics of the injection zone. | Operation of Class V.A. wells used in experimental technologies [as classified in R.61-87.11(E)(1)(g)] for underground injection into the subsurface or ground waters of the State of South Carolina – **applicable** | SCDHEC R.61-87.14(D) |

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| | 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)(g)], used for underground injections into the subsurface or ground waters of the State of South Carolina – **applicable** | SCDHEC R.61-87.14(G)(1) |
| | In determining the number, location, construction and frequency of monitoring of the monitoring wells the following criteria shall be considered:<br>(a) The population relying on the USDW affected or potentially affected by the injection operation;<br>(b) The proximity of the injection operation to points of withdrawal of drinking water;<br>(c) The local geology and hydrogeology;<br>(d) The operating pressures and whether a negative pressure gradient is being maintained; | | SCDHEC R.61-87.14(G)(2) |

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| | (e) The nature and volume of the injected fluid, the formation water, and the process by-products; and<br>(f) The injection well density. | | |
| | Monitoring requirements shall, at a minimum, specify:<br>• Monitoring of the nature of injected fluids with sufficient frequency to yield representative data on its characteristics;<br>• Monitoring of injection pressure and either flow rate or volume semi-monthly, or metering and daily recording of injected and produced fluid volumes as appropriate;<br>• Demonstration of mechanical integrity at least once every five years during the life of the well;<br>• Monitoring of the fluid level in the injection zone semi-monthly, where appropriate and monitoring of the parameters chosen to measure water quality in the monitoring wells semi-monthly.<br>*Note: Monitoring of injections and monitoring wells will be conducted pursuant to an EPA-approved monitoring plan documented in appropriate CERCLA RD/RA document.* | | SCDHEC R.61-87.14(G)(3)(a)-(d) |
| Plugging and abandonment of underground injection wells | The well to be abandoned shall be in a state of static equilibrium with the mud weight equalized top to bottom, by a method prescribed by DHEC prior to the placement of the cement plug(s). | Abandonment of Class V.A wells for underground injection of any fluids into the subsurface or ground waters of the State of South Carolina – **applicable** | SCDHEC R.87.15(B) |
| | The well must be plugged in such a manner which will not allow the movement of fluids either into or between underground sources of drinking water. | | SCDHEC R.87.15(C) |
| | Wells must be closed in a manner that complies with prohibition of fluid movement in 40 CFR 144.82(a). Also, any soil, gravel, sludge, liquids, or other materials | Class V wells [as defined in 40 CFR 144.6(e)] used to inject any fluids into the subsurface or | 40 CFR 144.82(b) |

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| | removed from or adjacent to the well must be disposed or otherwise managed in accordance with substantive applicable Federal, State, and local regulations and requirements. | groundwater –**applicable** | |
| ***Discharge of Wastewater from Treatment Unit*** | | | |
| Disposal of RCRA characteristic wastewaters | Are not prohibited, if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. pursuant to a permit issued under 402 of the CWA (i.e., NPDES permitted) unless the wastes are subject to a specified method of treatment other than DEACT in 40 CFR 268.40, or are D003 reactive cyanide.<br><br>*NOTE: Discharge of treated groundwater to an unnamed tributary of Durbin Creek will comply with NPDES Permit No. SC0047589* | Land disposal of hazardous wastewaters that are hazardous only because they exhibit a hazardous characteristic and are not otherwise prohibited under 40 CFR Part 268 – **applicable**. | 40 CFR 268.1(c)(4)(i) |
| | Are not prohibited, if the wastes are treated for purposes of the pre-treatment requirements of section 307 of the CWA unless the wastes are subject to a specified method of treatment other than DEACT in 40 CFR 268.40, or are D003 reactive cyanide. | | 40 CFR 268.1(c)(4)(ii) |
| Transport and conveyance of collected RCRA wastewater to WWTU located on the facility | Any dedicated tank systems, conveyance systems, and ancillary equipment used to treat, store or convey wastewater to an on-site NPDES-permitted wastewater treatment unit (WWTU) are exempt from the requirements of RCRA Subtitle C standards. | On-site wastewater treatment unit [as defined in 40 CFR 260.10] subject to regulation under §402 or §307(b) of the CWA (i.e., NPDES permitted) that manages hazardous wastewaters – **applicable** | 40 CFR 264.1(g)(6) |
| General duty to mitigate for discharge | Take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of effluent | Discharge of pollutants to surface waters – **applicable** | 40 CFR § 122.41(d) |

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| of WWTU | standards which has a reasonable likelihood of adversely affecting human health or the environment. | | SCDHEC R.61-9 §122.41(d) |
| | Properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used to achieve compliance with the effluent standards. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. | | SCDHEC R.61-9 §122.41(e)(1) |
| Technology-based treatment requirements for wastewater discharge | To the extent that EPA promulgated effluent limitations are inapplicable, State shall develop on a case-by-case basis under § 402(a)(1)(B) of the CWA, technology based effluent limitations by applying the factors listed in 40 CFR § 125.3(d) and shall consider: the appropriate technology for this category or class of point sources; and any unique factors relating to the discharger. | Discharge of pollutants to surface waters from other than a POTW – **applicable** | 40 CFR § 125.3(c)(2)<br>SCDHEC R.61-9 §125.3(c)(2) |
| Water quality based-effluent limits for wastewater discharge | Must develop water quality-based effluent limits that ensure that:<br>• The level of water quality to be achieved by limits on point sources(s) established under this paragraph is derived from, and complies with all applicable water quality standards; and<br>Effluent limits developed to protect narrative or numeric water quality criteria are consistent with the assumptions and any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR § 130.7. | Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard established under §303 of the CWA – **applicable** | 40 CFR § 122.44(d)(1)(vii)<br>SCDHEC R.61-9 § 122.44(d)(1)(vii) |
| Monitoring requirements for discharges from WWTU | In addition to §122.48 and to assure compliance with effluent limitations, one must monitor, as provided in subsections (i) thru (iv) of §122.44(i)(1).<br>*Note: Monitoring parameters, including frequency of sampling, will be developed as part of the CERCLA* | Discharge of pollutants to surface waters – **applicable** | 40 CFR §122.44(i)(1)<br>SCDHEC R.61-9 §122.44(i)(1) |

| Table A-1 Action-Specific ARARs | | | |
|---|---|---|---|
| **Action** | **Requirements** | **Prerequisite** | **Citation** |
| | *process and included in a Remedial Design, Remedial Action Work Plan, or other appropriate CERCLA document.* | | |
| | All effluent limitations, standards and prohibitions shall be established for each outfall or discharge point, except as provided under §122.44(k) | | 40 CFR §122.45(a)<br><br>SCDHEC R.61-9 §122.45(a) |

| Table A-2 Chemical-Specific ARARs | | | |
|---|---|---|---|
| ***Action/Media*** | **Requirements** | **Prerequisite** | **Citation** |
| Classification of ground water | All South Carolina groundwater that is a potential underground sources of drinking water is classified Class GB under SCDHEC R. 61-68H.9. | Groundwater, except within mixing zones, within the state of South Carolina – **applicable** | SCDHEC R. 61-68H.2 |
| Restoration of ground water as a potential drinking water source | All inorganic and organic contaminants in underground sources of drinking water may not exceed Maximum Contaminant levels (MCLs) as set forth in SCDHEC R.61-58, State Primary Drinking Water Regulations. | Groundwater classified as underground source of drinking water (USDW) as (defined in SCDHEC Reg. 61-68B.62) – **relevant and appropriate** | SCDHEC R. 61-68H.9.b<br>*(Groundwater Quality Standards for Class GB Ground Waters)*<br>40 CFR Part 141 Subpart G (*National Primary Drinking Water Regulations)* |
| | Shall not exceed concentrations or amounts such as to interfere with use, actual or intended, as determined by SCDHEC. | Presence of waste, pesticides, other synthetic organic compounds, deleterious substances, or constituents thereof not specified in SCDHEC R. 61-68H.9a or b. in Class GB groundwater – **relevant and appropriate** | SCDHEC R. 61-68H.9.c |
| Discharge to surface water | Any discharge into waters of the State must receive a degree of treatment and/or control which shall produce an effluent which is consistent with the Act, the Clean Water Act (P.L. 92-500, 95-217, 97-117, 100-4), this regulation, and related regulations. | Discharge of pollutants (including toxic substances) into waters of the State of South Carolina – **applicable** | SCDHEC R. 61-68E.4.a |
| All ground and surface waters | All ground waters and surface waters of the State shall at all times, regardless of flow, be free from:<br>a. Sewage, industrial waste, or other waste that will settle to form sludge deposits that are unsightly, | Standards applicable to all waters of the State - ***applicable*** | SCDHEC R. 61-68E.5 |

| | | | |
|---|---|---|---|
| | putrescent, or odorous to such degree as to create a nuisance, or interfere with classified water uses or existing water uses;<br><br>b. Floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses;<br><br>c. Sewage, industrial, or other waste which produce taste or odor or change the existing color or physical, chemical, or biological conditions in the receiving waters or aquifers to such a degree as to create a nuisance, or interfere with classified water uses (except classified uses within mixing zones as described in this regulation) or existing water uses;<br><br>and,<br><br>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 (except classified uses within mixing zones as described in this regulation), existing water uses, or which are harmful to human, animal, plant or aquatic life. | | |

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
CWA = Clean Water Act of 1972
DEACT = deactivation
EPA = U.S. Environmental Protection Agency
NPDES = National Pollutant Discharge Elimination System
RCRA = Resource Conservation and Recovery Act of 1976
SCDHEC = South Carolina Department of Health and Environmental Control
WWTU = Waste Water Treatment Unit