

# Cross Generating Station's Class 2 Landfill Remedy Selection Report

**Certification:** I, Susan W. Jackson, being a registered Professional Engineer in the State of South Carolina do hereby certify to the best of my knowledge, information, and belief that the information contained in this Cross Class 2 Landfill Remedy Selection Report dated July 31, 2020 was developed pursuant to the requirements of 40 CFR 257.97 and has been prepared with recognized and generally accepted good engineering practices.

Signature



*Susan W. Jackson*

Date

*July 27, 2020*

### Overview

The South Carolina Public Service Authority (Santee Cooper) is implementing the April 17, 2015 U.S. Environmental Protection Agency (U.S. EPA) Federal Coal Combustion Residuals (CCR) Rule (40 CFR § 257 and 261) for the Cross Generating Station's Class 2 Landfill, located in Berkeley County, South Carolina. This landfill is no longer operating and has been closed in accordance with state landfill regulations. In addition to federal CCR regulations, the landfill is also regulated by South Carolina Department of Health and Environmental Control (SCDHEC) under Post Closure Care Permit #08337-1601.

Assessment monitoring conducted in 2018 identified the presence of cobalt in one downgradient well at a statistically significant level exceeding the established groundwater protection standard (GWPS). The EPA Regional Screening Level (RSL) and GWPS for cobalt is 0.006 mg/L. As a result, Santee Cooper initiated the corrective measures assessment process including conducting a nature and extent characterization, continuing groundwater sampling, and issuing a corrective measures assessment report. Haley & Aldrich prepared the corrective measures assessment which proposed five alternatives and discussed how each met the threshold criteria and the balancing criteria. A public meeting was held December 3, 2019. The balancing criteria from the CMA report was re-evaluated considering public input. This Remedy Selection Report initiates the corrective measures implementation phase of the CCR Rule.

### Purpose

This Remedy Selection Report is for Cross Generating Station's Class 2 Landfill. The groundwater corrective measures remedy selected shall:

- (i) Be protective of human health and the environment;
- (ii) Attain the groundwater protection standard;
- (iii) Control the source(s) of releases to reduce or eliminate further releases into the environment;
- (iv) Remove as much of the contaminated material that was released from the CCR units as is feasible;
- (v) Comply with the standards for management of wastes.

Pursuant to 40 CFR §257.97(a) and (d), this report describes the selected remedy, how it meets the standards outlined above, and specifies a schedule for implementing and completing remedial activities.

### Remedy Selection Process

After the development of the Corrective Measures Assessment (CMA) report, the remedy selection process is continued by holding a public meeting to discuss the proposed alternatives for corrective measures. Pursuant to §257.96(e), *The owner or operator must discuss the results of the corrective*

*measures assessment at least 30 days prior to the selection of remedy, in a public meeting with interested and affected parties.* A public meeting was conducted at Cross Generating Station on December 3, 2019. Five alternatives were presented at the public meeting in which the public was invited to comment. Comments were received and incorporated into the remedy selection process. See Figure 1 below for the public meeting comments which completes the §257.96 and §257.97 requirements for the CMA.

During the interim period between the issuance of the corrective measures assessment report and the issuance of this Remedy Selection Report, a semi-annual progress report was prepared and posted on Santee Cooper's publicly accessible website describing the progress in selecting and designing the remedy. This semi-annual progress report was posted in January 2020. Four planned activities were documented in the progress report: respond to comments from public meeting, complete Remedy Selection Report, continue groundwater monitoring under the assessment monitoring program, and complete seepage system modification project. To date, the seepage modification project is complete and the other three tasks are underway.

Alternative 2 is selected as the remedial option and the remedial plan is described in more detail below. In accordance with §257.97, this alternative has been evaluated in the context of, and subsequently meets, the threshold criteria stated above. This remedy protects human health and the environment. Additionally, in accordance with §257.96 and §257.97, this alternative has been evaluated in the context of the balancing criteria compared to the other five alternatives and is outlined in the CMA Report which is available on Santee Cooper's public CCR website. Figure 1 provided at the end of this report is a summary of the five proposed alternatives and how each meets the threshold criteria and the balancing criteria.

#### Remedial Plan

Alternative 2 in the CMA Report is Landfill Closure plus monitored natural attenuation (MNA) with enhanced water management improvements. This remedy eliminates the source through capping in place which manages water inflows and outflows from the landfill, thereby meeting the source control requirement state above. Over time, the remedy allows the concentrations of these constituents in downgradient groundwater to attenuate.

It should be noted that the Class 2 Landfill ceased operations by December 31, 2015, and closure was completed by June 28, 2016 in accordance with state regulations and a plan approved by SCDHEC. The Class 2 Landfill was certified closed by SCDHEC on August 9, 2016 with a state post-closure permit issued on February 28, 2017. In addition to the federal CCR Rule groundwater monitoring program, a state groundwater monitoring program is in effect in accordance with the SCDHEC Post-Closure Permit #08337-1601. The applicable closure and post-closure documentation is posted on Santee Cooper's CCR website.

The landfill was closed by installing a low-permeability geomembrane and clay cap and cover along with surface water controls for drainage and erosion protection. The enhanced water management improvements refer to removing water present in the landfill at the time of closure. The Class 2 Landfill is constructed with a series of toe drains around the perimeter of the landfill. Although the Class 2 Landfill has been closed for more than three years, residual effluent has been observed seeping from the toe drain outlets which flows into unlined stormwater conveyances and is managed with other site stormwater. The improvement consists of installing a seepage collection system including discharge piping and lift stations. The flow from the toe drains is redirected to the operational Class 3 Landfill Leachate Collection Pond for further treatment prior to discharge under NPDES permit #SC0037401. Additionally, one of the toe drain outlets on the west side of the Class 2 Landfill was plugged to force flow south to the newly installed lift station. This was done to prevent new equipment or piping from being installed within the footprint of the future Class 3 Landfill cells. The landfill closure and water management improvements were completed in August 2016 and January 2020, respectively, under the oversight of SCDHEC.

The remaining component of the selected remedy is addressing the presence of cobalt in the groundwater above the established RSL/GWPS. Groundwater will be addressed through MNA. MNA is a viable remedial technology recognized by both state and federal regulators that is applicable to inorganic compounds in groundwater. The USEPA defines MNA as “the reliance on natural attenuation processes to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods”, which is a balancing criteria used to evaluate all remedies considered. The ‘natural attenuation processes’ that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants” (USEPA, 2015). MNA is intended to reduce concentrations of cobalt in groundwater at the Class 2 Landfill boundary, thereby attaining the groundwater protection standard and removing as much of the contaminated material that was released from the CCR units as is feasible.

A corrective measures groundwater monitoring plan for MNA will be prepared and implemented in accordance with §257.98, to document the effectiveness of the selected remedial alternative. Corrective measures are considered complete when groundwater monitoring reflects that the SSL constituent concentrations in groundwater downgradient of the Cross Class 2 Landfill do not exceed Appendix IV GWPS for three consecutive years. The plan will ensure that the handling of all CCR will comply with the standards of management of wastes.

USEPA is in the process of modifying certain CCR Rule requirements and, depending upon the nature of such changes, assessments made herein could be modified or supplemented to reflect such future regulatory revisions. See Federal Register (March 15, 2018; 83 FR 11584).

Remedy Selection, Interim Steps, Implementation & Schedule

The factors outlined in §257.97(d) were considered in the development of the schedule for design, implementation, and completion of the selected remedy.

Activity	Estimated Completion Date <sup>1</sup>
Landfill Closure (Cap in place) completed prior to initial Groundwater Assessment Monitoring	Completed – August 2016
Water Management Improvements	Completed – January 2020
Remedy Selection Report Issuance	July 2020
Prepare MNA Groundwater Monitoring Plan	August 2020
Conduct Semi-Annual Groundwater Monitoring in accordance with MNA Plan	October 2020 until GWPS met for 3 years consecutively
Annual Performance Review	Initiate January 2021
Notification of closure completion <sup>2</sup>	Until GWPS met consecutively for 3 years

## Notes:

1. These dates are subject to change depending on future changes to the federal CCR Rule.
2. Closure notification provided within 30 days after closure complete. Closure is complete when groundwater meets groundwater protection standards.

References




Haley & Aldrich, 2019. Corrective Measures Assessment, Santee Cooper Class 2 Landfill, Cross South Carolina. June 12, 2019.

U.S. EPA, 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response, Directive 9283.1-36. August 2015.

# FIGURE 1: SUMMARY OF CORRECTIVE MEASURES

## SANTEE COOPER – CROSS CLASS 2 LANDFILL

Alternative Number	Remedial Alternative Description	THRESHOLD CRITERIA					BALANCING CRITERIA			
		Be protective of human health and the environment	Attain the groundwater protective standard	Control the source of releases	Remove from the environment as much of the contaminated material that was released from the CCR unit as feasible	Management of waste in accordance with RCRA requirements	CATEGORY 1 Long- and Short-Term Effectiveness, Protectiveness, and Certainty of Success	CATEGORY 2 Effectiveness in Controlling the Source to Reduce Further Releases	CATEGORY 3 Ease of Implementation	CATEGORY 4 Consideration of Community Concerns*
1	Closure in Place (CIP) with Capping and Monitoring & Natural Attenuation (MNA)	✓	✓	✓	✓	✓	Effective short-term; expected to be effective long-term as the Landfill dries out.	Moderately effective; remedy relies on naturally occurring processes only. Technology verified through long-term groundwater monitoring.	Readily implementable and currently underway at the Landfill (approved by DHEC)	<p>* A public meeting was held December 3, 2019. There were 7 attendees and verbal feedback was positive. This is the only written comment received on the Cross Class 2 Landfill alternatives:</p> <p>Comment #1: "Definitely like the removal process and CIP monitoring of the cobalt in wells. Please keep informed. Any air pollutants [sic] as well." – Neighbor of Cross Generating Station</p>
2	CIP with Capping, MNA and Water Management Improvements	✓	✓	✓	✓	✓	Effective short-term; expected to be effective long-term. Landfill drainage collection improvements would further reduce cobalt entering groundwater.	Effective; remedy relies on naturally occurring processes only. Technology verified through long-term groundwater monitoring. Improvements to drainage system expected to further reduce the amount of cobalt entering groundwater.	Readily implementable and currently underway at the Landfill (approved by DHEC)	
3	CIP with Capping and Hydraulic Containment through groundwater pumping and direct discharge	✓	✓	✓	✓	✓	Effective short-term; expected to be effective long-term. Groundwater movement will be additionally controlled by hydraulic containment system.	Effective; hydraulic containment system will eliminate movement of cobalt in groundwater, but does not treat system discharge. Technology includes extraction well network and monitoring well network.	Readily implementable, but requires installation of wells (which will require permits)	
4	CIP with Capping and Hydraulic Containment through groundwater pumping and ex-situ treatment	✓	✓	✓	✓	✓	Effective short-term; expected to be effective long-term. Groundwater movement will be controlled by hydraulic containment system. Treatment system operations will generate waste, which will need to be disposed off site.	Effective; hydraulic containment system will eliminate movement of cobalt in the groundwater and the system discharge is treated. However, it creates secondary waste stream.	Implementable; will require installation of wells and treatment system (which will require multiple permits). Will require disposal of secondary waste stream.	
5	CIP with Capping and In-Situ Treatment	✓	✓	✓	✓	✓	Effective short-term; expected to be effective long-term. Treatment system will require bench scale and pilot testing to demonstrate effectiveness.	Effective; treatment system will eliminate migration of cobalt in groundwater	Implementable, but will require installation of wells and treatment system. The only required permits to design treatment system and for treatment equipment.	

 Most favorable when compared to other alternatives  
 Less favorable when compared to other alternatives  
 Least favorable when compared to other alternatives

Santee Cooper's selected alternative is No. 2.