santee cooper®

Hand Delivered

October 13, 2021

Byron Amick
SCDHEC – Water Facility Permitting Division
2600 Bull Street
Columbia, SC 29201

Subject: Cross Generating Station – NPDES Permit # SC0037401
Submission of Notice of Planned Participation (NOPP) Under 2020 Steam Electric Power Generating Effluent Guidelines – Contingent Voluntary Incentive Program

Dear Mr. Amick:

Pursuant to 40 C.F.R. § 423.19(h), Santee Cooper is submitting to the South Carolina Department of Health and the Environmental Control (Department) the attached information for making an election through a Notice of Planned Participation (NOPP) for Cross Generating Stations, Units 1-4. This NOPP is being submitted for establishing, on a contingent basis, the effluent discharge limitations set by the Voluntary Incentives Program (VIP) under 40 C.F.R. § 423.13(g)(3)(i) and will apply only under the conditions described below.

Cross Units 1-4 discharge under NPDES Permit No. SC0037401, which is currently in the process of renewal. In its initial NPDES permit renewal application, Santee Cooper has requested that the next version of the NPDES permit include generally applicable effluent limitations for flue gas desulfurization wastewater (FGDW) based on the effluent limitation guidelines set in 40 C.F.R. § 423.13(g)(1)(i). Santee Cooper hereby notifies the Department of its contingent election for the four Cross units to comply with the VIP requirements for FGDW under 40 C.F.R. § 423.13(g)(3)(i) on a contingent basis, which would apply only if Santee Cooper were to make the election described below.

Santee Cooper is currently conducting a pilot study of a biological treatment system, which EPA has identified as the reference control technology in setting the generally applicable effluent limitations for the FGDW. The trial is ongoing, but should it ultimately turn out to be unsuccessful – or if other new information gathered by Santee Cooper indicates that the VIP approach is preferable – Santee Cooper will elect to modify the NPDES permit for the four Cross units, as currently allowed under condition V.A.7. of the draft NPDES permit. In such a case and only after this election has been made, the VIP requirements for FGDW under 40 C.F.R. § 423.13(g)(3)(i) will apply to Cross Units 1-4, in lieu of the generally applicable requirements for FGDW under 40 C.F.R. § 423.13(g)(1)(i).

The attached document contains the contents that 40 CFR 423.19(h) requires for making the NOPP election on a contingent basis for the four Cross units. The submission of this information documents

and confirms Santee Cooper's intent in meeting the VIP effluent discharge limitations (if determined to be appropriate and so elected) in lieu of the generally applicable requirements based on new information gathered for evaluating performance of, and other relevant information on the effectiveness of, the control technologies for meeting the effluent discharge requirements. At a later date, after Santee Cooper has completed its technical review of the available control technologies, Santee Cooper will submit a report to the Department, which could include a request to modify the permit. Should such review take longer than a year, annual progress reports would be provided describing the progress of our evaluation.

If you have any questions or concerns, please contact Jesse Cannon of my office at (843)761–8000, extension 4377 or jesse.cannon@santeecooper.com.

Sincerely,

Pamela J. Williams
Chief Public Affairs Officer and General Counsel

PJW:JHC:JWC:

Attachment: Cross NOPP for Contingent VIP

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File: ECM/Environmental Management/Water/Generation/CGS/NPDES WW Discharge/ Permitting/2021 10 13 CGS Contingent VIP NOPP Submittal Letter.pdf

Santee Cooper – Cross Generating Station
Notice of Planned Participation – Voluntary Incentive Plan for Flue Gas Desulfurization Discharges

Santee Cooper's Cross Generating Station (CGS) is a four unit, coal-fired electric generating station located in Pineville, South Carolina. CGS was first placed in service in 1983 with the construction of a coal-fired electrical generating unit, Unit 2. Units 1, 3 and 4 followed in 1995, 2007, and 2008, respectively. The station discharges to the Diversion Canal to Lake Moultrie in accordance with South Carolina's Department of Health and Environmental Control (DHEC) National Pollutant Discharge Elimination System (NPDES) permit SC0037401. CGS is subject to EPA's Effluent Limit Guidelines (ELGs) under 40 CFR 423: Steam Electric Power Generating Point Source. Revised ELGs under the Steam Electric Reconsideration Rule were published on October 13, 2020, and include new requirements for flue gas desulfurization (FGD) wastewater (WW) discharges.

The purpose of this document is to provide information to DHEC about CGS's contingent election to comply with the voluntary incentive plan (VIP) requirements for FGD wastewater treatment as outlined in the 2020 revision of the ELGs, which would apply only if Santee Cooper makes the election described in the accompanying cover letter. CGS has been piloting treatment with biological treatment vendors in an effort to establish that the best available technology economically achievable (BAT) treatment option as established by EPA is viable at this site. The pilot is not complete so Santee Cooper does not want to rule out the VIP alternative while the pilot continues.

This Notice of Planned Participation (NOPP) includes descriptions of the likely methodologies available to be used that would qualify for the VIP option and limits, should that prove to be the preferred option for ELG compliance. An engineering dependency chart for attaining compliance with 40 CFR 423.13(g)(3)(i) by the required date of December 31, 2028, is included as Attachment 1.

FGD Wastewater Treatment Approach and Brine Disposal

The 2020 FGD wastewater VIP ELG discharge limitations are shown in Table 1.

Parameter	Daily Max	Monthly Average
Arsenic, total (µg/L)	5	N/A
Mercury, total (ng/L)	23	10
Selenium, total (µg/L)	10	N/A
Nitrate-nitrite, as N (mg/L)	2.0	1.2
Bromide (mg/L)	0.2	N/A
Total Dissolved Solids (TDS) (mg/L)	306	149

Table 1. 2020 FGD Wastewater ELGs for VIP Option

Candidate technologies have been identified for further consideration to comply with these VIP limits. These include thermal evaporation with no resultant wastewater discharge, traditional reverse osmosis (RO) with brine encapsulation, and multi-pass, high-shear membranes with brine encapsulation. High

quality permeate from these processes (if present) may be used as makeup water for the FGD scrubber or other uses. Depending upon the treatment approach, the required limits for the permeate in the VIP option will be met or a no-discharge use for this water will be established.

Encapsulation of the brine is intended to solidify the RO reject solution to allow for disposal in a landfill. Various constituents are mixed with the RO reject solution to form a flowable fill that rapidly solidifies. For FGD wastewater encapsulation, typical constituents mixed with the RO reject are fly ash, bottom ash, gypsum, lime, and/or Portland cement in varying ratios. Encapsulation will require a site-specific brine solidification formula as FGD wastewater is highly variable. Due to this variability, it is expected that significant research and development will be required. CGS would work with industry groups and academia, along with consulting engineers, to determine the brine solidification formula that chemically and physically stabilizes the material and minimizes the operating costs of encapsulation.

Significant experimentation and testing with varying formulations for encapsulation may be necessary. One objective of this process is to have a flowable fill that does not set up in pipes going to the landfill, while still achieving the necessary strength, low permeability, and solidification after placement. Thermal evaporation would generate a dry solid which would be co-managed with fly ash in the landfill. For both encapsulation and thermal evaporation options it will be necessary to work with DHEC permitting authorities to obtain appropriate permits.

Engineering Dependency Schedule for VIP Option

A detailed Engineering Dependency Chart as required by the ELGs is described below and shown in Attachment 1. This proposed schedule may change slightly because a number of utilities will be competing for the same resources. Schedules providing additional detail will be developed as the technology evaluation proceeds and will be provided with annual reports.

FGD WW Characterization / Scrubber Water Balance

Characterization of CGS's FGD wastewater has been conducted in addition to ongoing biological piloting, which is not yet complete. CGS will determine compatibility with the available membrane technology providers that have had experience in treating FGD wastewater, at least on a pilot scale. This previous FGD wastewater characterization would also assist with the identification of additional pre-treatment that may be required to protect the membranes. In addition to the chemical analyses of the wastewater, a detailed water balance of FGD scrubber operations will be used to evaluate opportunities to reduce the volume of wastewater generated that requires treatment. These activities have been in progress since the beginning of 2021 and are expected to be complete soon.

Develop Specifications, Bench & Pilot Testing

As evaluation of the VIP option proceeds, specifications will be developed, and vendors approached. Data will be shared with technology providers and bulk samples shipped for testing of prospective system(s). On-site piloting of membrane treatment technologies may be undertaken. Pilot operations should be over several months to allow for variability in FGD scrubber chemistry or other site operations (generating load, startup, shutdown, weather, etc.). Should piloting be pursued, simultaneous testing with multiple vendors is preferable to minimize variability, so scheduling should accommodate multiple

vendors' equipment availability. This actual piloting is expected to take approximately seven months once the piloting equipment is on site. Pilot testing will not commence prior to DHEC approval to proceed.

Complete Detailed Design

Once a technology is selected, the process of bid award and detailed design is expected to last approximately seventteen months.

Permitting / DHEC Approval to Construct

CGS will request an NPDES permit modification to accommodate the VIP limits and construction approval from DHEC for the selected system. This effort is expected to take eight months and can proceed once the detailed design is sufficiently developed to allow permit applications to be completed.

Construction

Once the contracting and detailed design step is complete, construction of the membrane equipment and system tie-ins can begin. Construction of pre-treatment to prevent fouling of the membranes, installation of membrane technology with built-in clean in place systems, and necessary tie-ins is expected to take approximately eighteen months.

System Startup

Startup of the selected system will commence immediately upon completion of construction and is expected to take three months.

Develop Brine Solidification Formula (If Selected)

If evaporative technology is not selected, development of the site-specific brine management approach is expected to require expertise from industry and/or academia using brine encapsulation models as appropriate. Research in encapsulation should test out various mixtures of fly ash, brine, Portland cement, etc. Various tests of the resulting product (sometimes referred to as paste) would be conducted to determine its flowability, time to solidify, chemical stability, strength, and other properties. Equipment will be designed and installed for brine management. The brine management process has been allowed significant time to ensure VIP implementation can be achieved by the December 31, 2028 date established by the 2020 ELG rule.

If evaporative technology is selected, a similar period to install tie-ins is anticipated.

Attachment 1 – Engineering Dependency Chart

Attachment 1

Santee Cooper Cross Flue Gas Desulfurization - Voluntary Incentive Plan Engineering Dependency Chart

Task Name	Start	End
Santee Cooper Cross Station FGD VIP Engineering Dependency Chart		**12/31/2028**
Ongoing activities (Engineering contractor selected, project kickoff, compliance strategy, FGD characterization, develop FGD water balance)	1/1/2021	12/30/2021
Provide FGD characterization data, develop specifications, provide bulk volumes for bench testing w/vendors, obtain pilot approval, conduct pilots	1/1/2022	4/30/2023
Complete detailed design	5/1/2023	9/30/2024
Submit Request/Obtain Approval to Construct from DHEC (some parallel activities with detailed design); obtain permits	1/1/2024	9/30/2024
Construction	10/1/2024	3/31/2026
Membrane system commissioning	4/1/2026	6/30/2026
Develop brine solidification formula (if selected), finalize thermal evaporative system tie ins, overall system commissioning	6/1/2026	11/30/2028
ELG Applicability date		12/31/2028