



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

SEP 10 2018

OFFICE OF  
AIR AND RADIATION

Mr. Thomas Curtis  
Vice President, Generating Stations  
South Carolina Public Service Authority  
1 Riverwood Drive  
P.O. Box 2946101  
Moncks Corner, SC 29461

Re: Request for Alternative Stratification Test Procedure for Units 1 through 4 at Winyah Generating Station (ORIS 6249)

Dear Mr. Curtis:

The United States Environmental Protection Agency (EPA) has reviewed the May 23, 2018 petition submitted under 40 CFR 75.66 by the South Carolina Public Service Authority (Santee Cooper) for units 1 through 4 at Winyah Generating Station (Winyah), ORIS 6249, requesting authorization to perform the stratification test procedures set forth in section 6.5.6.1 of appendix A to part 75 with a modification to address temporal variations in the gas concentrations. Specifically, Santee Cooper requested authorization to modify the stratification test using the normalization procedure for temporal variations set forth in EPA Method 30A in section 8.1.3.3 of appendix A-8 to part 60. Santee Cooper also requested authorization to apply these modified procedures when computing the stratification test results from the data collected for a relative accuracy test audit (RATA) on August 16, 2017 at Winyah unit 4. EPA approves the petition, with conditions, as discussed below.

Background

Santee Cooper owns and operates the Winyah power plant, located in Georgetown, South Carolina. Winyah units 1 through 4 are coal-fired boilers equipped with wet limestone flue gas desulfurization systems (i.e., wet scrubbers) to control their sulfur dioxide (SO<sub>2</sub>) emissions. According to Santee Cooper, units 1 through 4 are subject to the Acid Rain Program and certain Cross-State Air Pollution Rule trading programs. Santee Cooper is therefore required to continuously monitor and report the units' SO<sub>2</sub>, nitrogen oxides (NO<sub>x</sub>), and carbon dioxide (CO<sub>2</sub>) emissions and heat input in accordance with 40 CFR part 75. To meet these monitoring requirements, Santee Cooper operates continuous emission monitoring systems (CEMS) for gas concentrations and stack gas flow rate.

Part 75 requires periodic (semiannual or annual) relative accuracy test audits (RATAs) of the gas and flow rate monitoring systems for quality-assurance purposes. Part 75 provides several options for determining the location and number of traverse points from which sample measurements should be taken when performing a gas monitoring system RATA. One option for conditions where stratification of flue gases is likely to occur (e.g., downstream of a wet scrubber) allows for use of a short reference



measurement line<sup>1</sup> as provided in performance specification 2 in section 8.1.3 of appendix B to part 60. In order to qualify to use the short reference measurement line, part 75 requires the performance of a 12-point stratification test in section 6.5.6.1 of appendix A to part 75 prior to the initial gas RATA at that location and then either a 12-point stratification test or the alternate (abbreviated) stratification test procedures found in section 6.5.6.2 of appendix A prior to each subsequent gas RATA. Each of these stratification tests must be passed according to the acceptance criteria of section 6.5.6.3(a) of appendix A. Prior to the gas RATA conducted on August 16-17, 2017, a 12-point stratification test was performed on unit 4. However, the NO<sub>x</sub> test results did not meet the acceptance criteria of section 6.5.6.3(a) to permit sampling using the short reference method measurement line.

Santee Cooper is requesting approval of a modified stratification test procedure that considers temporal variation in the gas concentration measurements, asserting that a modified stratification test accounting for the temporal variation in the measurements due to varying process conditions would more accurately demonstrate whether or not stratification is present at the time of the test. With respect to the August 2017 stratification test in particular, Santee Cooper contends that despite best efforts made during that test to maintain steady state conditions, minor load changes caused fluctuations in emissions that complicated the determination of whether or not stratification was present in the stack during the test.

The requested test modification would apply a procedure allowed in another EPA test – Method 30A, which is a reference test method for mercury emissions – to the 12-point stratification test set forth in section 6.5.6.1 of appendix A to part 75. Method 30A includes a procedure to normalize gas concentration measurements taken during a stratification test to account for temporal variations in gas concentrations that “may complicate the determination of stratification.”<sup>2</sup> Under the procedure in Method 30A, while conducting gas concentration measurements at multiple traverse points in order to check for stratification, the tester simultaneously conducts gas concentration measurements at a fixed point. Once the two sets of measurements have been obtained, the tester accounts for temporal variation by normalizing the traverse point measurements to account for changes in gas concentration over the time required to complete the stratification test. Specifically, the tester multiplies the measurement at each traverse point by the ratio of (i) the average of all the values measured at the fixed point over the duration of the entire stratification test to (ii) the value measured at the fixed point simultaneously with that particular traverse point measurement. In order to apply this procedure to the stratification test results conducted at Winyah, Santee Cooper proposes to use the CEMS measurements as the fixed-point measurements that were taken simultaneously with the reference method traverse point measurements.

To support the need for this proposed normalization procedure with regard to the August 2017 stratification test, Santee Cooper provided one-minute CEMS data measured during the period in which the 12-point stratification test was conducted. These data indicate that the NO<sub>x</sub> concentrations measured by the CEMS during the test period varied between 26.6 and 37.8 parts per million (ppm), representing a spread of 30% relative to the arithmetic average of 33.95 ppm over the entire test period.

While comparing the one-minute NO<sub>x</sub> concentration data collected by the CEMS and reference method sampling systems, Santee Cooper also determined that a three-minute offset was necessary to account for the differences between the response times of the NO<sub>x</sub> CEMS and the reference method system and properly synchronize the data collected using the different systems. Specifically, Santee

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<sup>1</sup> See section 6.5.6(b)(3) of appendix A to 40 CFR part 75.

<sup>2</sup> See section 8.1.3.3 of Method 30A, appendix A-8 to 40 CFR part 60.



Cooper shifted the reference method sampling system one-minute data back in time by three minutes and then applied the normalization procedure from Method 30A. To support the appropriateness of the three-minute shift, Santee Cooper graphed the CEMS and reference method data with and without the response time adjustment. When the response time adjustment was applied, the corresponding graphical comparison demonstrated that the two systems tracked one another closely. For consistency and accuracy, the three-minute offset was also applied to the reference method system data collected for the NO<sub>x</sub> RATA runs, and the result was an improvement in the calculated relative accuracy from 1.95% to 1.31%. Santee Cooper also provided a technical explanation for the difference in response times between the two systems, stating that while the CEMS and reference method sampling systems were very similar with respect to physical dimensions, the reference method system had a lower sample flow rate, supporting the three-minute offset in the direction applied to the reference method one-minute data.

Santee Cooper also evaluated whether shifting the August 2017 SO<sub>2</sub> and CO<sub>2</sub> reference method test data by three minutes would affect the relative accuracy computed for those gases and determined that it would not. Likewise, the August 2017 stratification test results for SO<sub>2</sub> and CO<sub>2</sub> would qualify for the RATA short measurement line found in performance specification 2 in section 8.1.3 of appendix B to part 60 whether or not the data are normalized using the procedures in section 8.1.3.3 of Method 30A.

#### EPA's Determination

EPA agrees that the stratification test procedure in section 6.5.6.1 of appendix A to part 75 does not take into account temporal variations in pollutant concentrations that may occur as a result of process changes during the test. EPA also agrees that modifying the stratification test procedure by normalizing stratification test results using the EPA-developed and approved procedure found in Method 30A will help to address such temporal variations. Based on the information provided by Santee Cooper, EPA also agrees that a three-minute adjustment to the August 2017 reference method stratification measurement data points is reasonable to properly synchronize the fixed-point and stratification traverse point measurements for purposes of meeting the acceptance criteria in section 6.5.6.3(a). Although Santee Cooper's petition identifies temporal variation and synchronization issues and seeks relief only as to the NO<sub>x</sub> concentration data, EPA believes that the identified issues would necessarily apply with equal force to the SO<sub>2</sub> and CO<sub>2</sub> concentration data measured simultaneously by the same fixed-point and reference method measurement systems. EPA assumes that the issues were not apparent in the SO<sub>2</sub> and CO<sub>2</sub> test results in this instance because the variability in SO<sub>2</sub> and CO<sub>2</sub> concentrations across the test period was lower than the variability in NO<sub>x</sub> concentrations.

EPA approves the request for a modification to the 12-point stratification test procedure in section 6.5.6.1 of appendix A to part 75 to correct for temporal variation in the measured gas concentrations at Winyah unit 4 during the stratification test conducted on August 16, 2017. EPA also approves the request for the ability to correct for temporal variation as necessary for future stratification tests performed on Winyah units 1 through 4 for part 75 purposes. To correct for temporal variation during the August 16, 2017 stratification test and subsequent RATA runs performed with equivalent reference method equipment (i.e., the same physical dimensions and sample flow rate), Santee Cooper shall shift all concentration measurements by the reference method system back in time by three minutes. Santee Cooper shall apply the same modified procedures and time-shifting adjustment to all gases measured during each test – i.e., not just NO<sub>x</sub>, but also SO<sub>2</sub> and CO<sub>2</sub>.



To correct for temporal variation on future stratification tests performed on Winyah units 1 through 4, Santee Cooper must proceed as follows:

1. In addition to collecting gas concentration measurements at 12 traverse points according to the procedures for a 12-point stratification test,<sup>3</sup> Santee Cooper must collect gas concentration measurements for each gas measured at the test location at a fixed measurement point at least one meter from the stack or duct wall throughout the entire stratification traverse.
2. To provide the fixed-point data, Santee Cooper may use either a second reference method sampling system or quality-assured data from an installed CEMS. Santee Cooper must collect the fixed-point data concurrently with the measurements collected at the 12 traverse points.
3. To normalize the data collected at each traverse point, Santee Cooper must multiply the measured concentration at each traverse point by the ratio of  $C_{F, avg}$  to  $C_F$ , where  $C_F$  is the simultaneous fixed-point concentration measurement and  $C_{F, avg}$  is the average of all the fixed-point measurements over the duration of the stratification test.
4. As necessary, Santee Cooper must resubmit any revised gas RATA results conducted during Q3 2017 to account for any shifting of data due to the differences in response times between the CEM and reference method sampling systems.

To determine whether the results of the normalized 12-point stratification test for a gas meet the acceptance criteria in section 6.5.6.3(a) or (b) of appendix A, Santee Cooper must calculate the arithmetic average of the normalized concentrations for that gas across all traverse points and determine the percent deviation of the normalized concentration at each traverse point from the arithmetic average of the normalized concentrations across all traverse points. This procedure should be performed for each of the gases being measured at the test location. If the calculated percent deviations for all gases measured at the test location meet the acceptance criteria in section 6.5.6.3(a) or (b) of appendix A, the short reference method measurement line or a single reference measurement point, as applicable, may be used for performing the RATA for the gases at that test location. If the calculated percent deviations for one or more gases do not meet the acceptance criteria in section 6.5.6.3(b) but the calculated percent deviations for all gases meet the acceptance criteria in section 6.5.6.3(a), the short reference method measurement line described in section 6.5.6(b)(3) may be used when performing the RATA for the gases at that test location.

Santee Cooper must keep records of the raw data and calculated test results of the modified stratification tests.<sup>4</sup>

EPA's determination relies on the accuracy and completeness of information provided by Santee Cooper in the May 23, 2018 petition, and is appealable under 40 CFR part 78. If you have any questions regarding this determination, please contact Carlos Martinez at (202 343-9747). Thank you for your continued cooperation.

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<sup>3</sup> See section 6.5.6 of appendix A to 40 CFR part 75.

<sup>4</sup> See § 75.59(a)(7)(vi).

Sincerely,

A handwritten signature in black ink, appearing to read "Reid P. Harvey", with a long, sweeping horizontal stroke extending to the right.

Reid P. Harvey, Director  
Clean Air Markets Division

cc: Carlos Martinez, CAMD  
David McNeal, U.S. EPA, Region 4  
David Monroe, South Carolina Department of Health & Environmental Control