



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

SEP 30 2013

OFFICE OF
AIR AND RADIATION

Mr. James M. Landreth
Vice President, Fossil/Hydro Generation
Designated Representative
South Carolina Electric and Gas
220 Operation Way, MC A221
Cayce, SC 29033-3701

Re: Petition for Approval of Site-specific F_c Factors for Unit CAN2 at the Canadys Steam Plant (Facility ID (ORISPL) 3280) During a Trial Burn of Manufactured Fuel

Dear Mr. Landreth:

The United States Environmental Protection Agency (EPA) has reviewed the April 9, 2013 petition submitted under 40 CFR 75.66 by South Carolina Electric and Gas (SCE&G). In the petition, as corrected and modified in subsequent communications, SCE&G requests approval of site-specific F_c factors for Unit CAN2 at the Canadys Steam Plant for use during a trial burn of mixtures of coal and a manufactured fuel/sorbent product. EPA approves the petition as corrected and modified, with conditions, as discussed below.

Background

SCE&G owns and operates the Canadys Steam Plant (Canadys), which is located in Colleton County, South Carolina. Canadys Unit CAN2 is a coal-fired boiler serving a generator capable of producing approximately 125 megawatts of gross generation. According to SCE&G, Unit CAN2 is subject to the Acid Rain Program and the Clean Air Interstate Rule annual and ozone-season emission trading programs. SCE&G is therefore required to continuously monitor and report the unit's nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon dioxide (CO_2) mass emissions, NO_x emission rate, and heat input rate, all in accordance with 40 CFR Part 75.

The April 9 petition states that SCE&G plans to conduct a trial burn at Unit CAN2 of mixtures of coal and ReEngineered Feedstock (ReEF), a fuel manufactured from reprocessed solid wastes and emission-reducing sorbent materials.¹ The maximum proportion of ReEF burned is expected to be approximately 10 percent of total heat input, corresponding to approximately 19 percent of total fuel weight.² The purpose of the trial burn is to evaluate the

¹ ReEF is considered a non-waste fuel under 40 CFR Part 241 and therefore may be burned without subjecting Unit CAN2 to federal regulations addressing combustion of solid wastes. See Letter from James Berlow, EPA Office of Solid Waste and Emergency Response, to Claudia O'Brien and Robert Wyman, Latham & Watkins LLP (Aug. 24, 2012), available at <http://www.epa.gov/epawaste/nonhaz/define/pdfs/ReCommunityLetterAugust24.pdf>.

² The April 9 petition included a table showing planned fuel mixtures with proportions of ReEF ranging up to 30 percent of total fuel weight. In later communications with EPA, SCE&G has indicated that the table was labeled incorrectly and that the stated

emission reduction and other performance impacts that result from co-firing ReEF with coal. In the petition, SCE&G provides information on ReEF and notes that the anticipated emission changes are well within the measurement capabilities of Unit CAN2's continuous emission monitoring systems (CEMS). SCE&G also describes the range of planned tests, including CEMS data analysis, stack testing, and coal and ReEF sampling and analysis, and reports that state environmental regulators have already approved the testing plans.

Several of the variables SCE&G is required to continuously monitor and report for Unit CAN2 under Part 75 are calculated based in part on the unit's carbon-based F-factor (F_c).³ F_c is a fuel-specific factor representing the ratio of the volume of CO₂ generated to the calorific value of fuel combusted, expressed in standard cubic feet of CO₂ per million Btu of fuel heat input (scf CO₂/mmBtu).⁴ Table 1 of Appendix F of Part 75 provides default F_c values for the most common boiler fuels. As an alternative to use of the default values, for any Table 1 fuel Part 75 allows use of a site-specific F_c value calculated based on sampling and analysis of the fuel's carbon content and calorific value.⁵ Where a unit burns a mixture of Table 1 fuels, Part 75 allows either use of the highest F_c value for any of the individual fuels burned⁶ or else calculation of a weighted F_c value based on the F_c values of the individual fuels.⁷ However, where a unit burns a mixture of a Table 1 fuel and a fuel not listed in Table 1, Part 75 requires the F_c value to be specifically approved by EPA under § 75.66.⁸

ReEF is not listed in Table 1 of Appendix F, and EPA's approval of an appropriate F_c value for use during the trial burn is therefore required. Based on data obtained from analysis of

percentages were intended to represent the proportions of total fuel heat input. SCE&G has also indicated that the plan has been modified since the petition was submitted to EPA, and that the maximum planned proportion of ReEF is now approximately 10 percent of total heat input. See Email from Richard Storm, Innovative Combustion Technology, to Carlos Martinez, EPA Clean Air Markets Division (Sept. 16, 2013) (documenting September 5, 2013 phone discussion between EPA and SCE&G staff).

³ Under Unit CAN2's monitoring plan, the F_c factor affects the calculations of NO_x emission rate, heat input rate, and NO_x mass emissions. We note that while SCE&G has also provided information related to the unit's oxygen-based F factor, that information is not discussed here because the F factor is not used under the unit's monitoring plan.

⁴ Part 75, Appendix F, section 3.3.5. F_c is determined at standard conditions of 20 °C (68 °F) and 29.92 inches of mercury. *Id.*

⁵ The site-specific F_c value for a fuel listed in Table 1 of Appendix F is computed using Equation F-7b (restated in the April 9 petition as equation 2):

$$F_c = 321 * 10^3 * \%C / GCV$$

where %C is the fuel's carbon content by weight expressed as a percentage of total fuel weight and GCV is the gross calorific value of the fuel expressed in Btu per pound of fuel (Btu/lb). The calculation must be based on at least nine fuel samples and the ultimate analysis of the fuel must be performed using approved methods. Part 75, Appendix F, sections 3.3.6, 3.3.6.1, 3.3.6.2.

⁶ Part 75, Appendix F, section 3.3.6.5.

⁷ The weighted F_c value for a combination of fuels listed in Table 1 of Appendix F is computed using Equation F-8 (restated in the April 9 petition as equation 4):

$$F_c = (1 - X) * F_{c_coal} + X * F_{c_ReEF}$$

where X is the fraction of total heat input provided by ReEF, and F_{c_coal} and F_{c_ReEF} are the respective F_c values for the individual fuels. Part 75, Appendix F, section 3.3.6.4.

⁸ Part 75, Appendix F, section 3.3.6.3.

many samples over a two-year period, SCE&G has projected site-specific F_c values of 1,792 scf CO_2/mmBtu and 1,986 scf CO_2/mmBtu for the coal and ReEF, respectively, that will be combusted during the trial burn.⁹ Assuming that ReEF will constitute a maximum of approximately 10 percent of the unit's total heat input, SCE&G has calculated a weighted F_c value of 1,811 scf CO_2/mmBtu .¹⁰ Accordingly, SCE&G's April 9, 2013 petition, as corrected and modified in subsequent communications, is interpreted as requesting approval of an F_c value of 1,811 scf CO_2/mmBtu for use during the trial burn of mixtures of coal and ReEF at Canadys Unit CAN2.¹¹

EPA's Determination

EPA conditionally approves SCE&G's petition for F_c values to be used during the trial burn of mixtures of coal and ReEF at Canadys Unit CAN2. The terms and conditions of this approval are as follows:

- (1) EPA approves a weighted F_c value of 1,811 scf CO_2/mmBtu for the trial burn of a fuel mixture of approximately 10 percent ReEF and 90 percent bituminous coal by heat input in Canadys Unit CAN2, corresponding to a fuel mixture of approximately 19 percent ReEF and 81 percent bituminous coal by weight. SCE&G shall use this approved F_c value to calculate and report the hourly NO_x emission rates (lb/mmBtu), hourly NO_x mass emissions (lb), and hourly heat input rates (mmBtu) for Unit CAN2 during the trial burn period, except as otherwise provided below.
- (2) If the actual weight of ReEF combusted in the trial burn is less than 19 percent of the combined total weight of coal and ReEF combusted (calculated once for the total fuel mixture combusted over the trial burn period as a whole), SCE&G shall use the approved F_c value of 1,811 scf CO_2/mmBtu for reporting purposes. However, if the actual weight of ReEF combusted exceeds 20 percent (i.e., 19 percent times 105 percent) of the combined total weight of coal and ReEF combusted, SCE&G shall use Equation F-8 to recalculate the weighted F_c value for the fuel mixture and shall use

⁹ Based on ultimate analysis of approximately 120 samples of coal delivered to Canadys over the last two years, SCE&G has provided values for %C and GCV of Unit CAN2's coal supply of 71.16% and 12,750 Btu/lb, respectively. Based on ultimate analysis of approximately 300 ReEF samples by the ReEF manufacturer over the last two years, SCE&G has provided values for %C and GCV of ReEF of 37.74% and 6,100 Btu/lb, respectively. From Equation F-7b in Appendix F of Part 75:

$$F_{c_coal} = 321 * 10^3 * 71.16 / 12,750 = 1,792 \text{ scf } \text{CO}_2/\text{mmBtu}.$$

$$F_{c_ReEF} = 321 * 10^3 * 37.74 / 6,100 = 1,986 \text{ scf } \text{CO}_2/\text{mmBtu}.$$

We note that in the April 9 petition SCE&G mistakenly provided data for a coal that will not be used in the trial burn. SCE&G later provided the data reported here for the coal that will be used in the trial burn. See Email from Richard Storm, Innovative Combustion Technology, to Carlos Martinez, EPA Clean Air Markets Division (Sept. 16, 2013) (documenting September 5, 2013 phone discussion between EPA and SCE&G staff).

¹⁰ From Equation F-8 in Appendix F of Part 75, using the values for X, F_{c_coal} , and F_{c_ReEF} stated in the text::

$$F_c = (1 - 10\%) * 1,792 + 10\% * 1,986 = 1,811 \text{ scf } \text{CO}_2/\text{mmBtu}$$

¹¹ SCE&G's request as originally stated in the April 9 petition has been restated here to reflect the corrected and modified information described in earlier footnotes. 3

the recalculated value to report the hourly NO_x emission rates, hourly NO_x mass emissions, and hourly heat input rates for Unit CAN2 during the trial burn period.

- (3) The April 9, 2013 petition indicates that before or during the trial burn, samples of the coal and ReEF will be taken and analyzed for carbon content (%C) and gross calorific value (GCV). If the analysis of these samples shows that the average %C or GCV value of either the coal or the ReEF combusted over the trial burn period differs by five percent or more from the corresponding %C or GCV value used to calculate the approved F_c value above,¹² SCE&G shall use equations F-7b and F-8 to recalculate the weighted F_c factor for the fuel mixture and shall use the recalculated F_c to report the hourly NO_x emission rates, hourly NO_x mass emissions, and hourly heat input rates for Unit CAN2 during the trial burn period.

EPA's determination relies on the accuracy and completeness of SCE&G's April 9, 2013 petition and the supplementary information provided to EPA on September 5, 2013 and confirmed on September 16, 2013, and is appealable under 40 CFR Part 78. If you have any questions regarding this determination, please contact Carlos R. Martinez at (202) 343-9747 or by e-mail at martinez.carlos@epa.gov. Thank you for your continued cooperation.

Sincerely,



Reid P. Harvey, Director
Clean Air Markets Division

cc: David McNeal, EPA Region IV
Michael D. Shroup, South Carolina DHEC
Carlos R. Martínez, CAMD

¹² Based on the %C and GCV values used to calculate the approved F_c of 1,811 scf CO₂/mmBtu, recalculation under this condition is required if one or more of the average values obtained from analysis of samples of fuels combusted during the trial burn period meets the following criteria:

Coal %C: less than 67.60% or more than 74.72%

Coal GCV: less than 12,100 Btu/lb or more than 13,400 Btu/lb

ReEF %C: less than 35.85% or more than 39.63%

ReEF GCV: less than 5,800 Btu/lb or more than 6,400 Btu/lb.