



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Mr. Donald G. Atwood
President
Benson Power, LLC
900 Industry Drive
Benson, MN 56215

JUN - 7 2018

OFFICE OF
AIR AND RADIATION

Re: Petition for Approval of Site-specific F_c Factor Methodology for Unit BLR-1 at the Benson Power Biomass Plant (Facility ID (ORISPL) 55867)

Dear Mr. Atwood:

The United States Environmental Protection Agency (EPA) has reviewed the November 3, 2016 petition and December 12, 2017 revised petition submitted under 40 CFR 75.66 by Benson Power, LLC (“Benson”) requesting approval of a site-specific carbon-based F-factor (F_c) methodology for Unit BLR-1 at the Benson Power Biomass Plant. EPA approves the petition in part, with conditions, as explained below.

Background

Benson Power Biomass Plant Unit BLR-1, located in Benson, Minnesota, is a stoker-fired boiler that combusts a combination of poultry litter, wood, and a very small percentage of other biomass fuels, as well as propane. According to Benson, Unit BLR-1 is subject to the Acid Rain Program and trading programs for annual emissions of nitrogen oxides (NO_x) and sulfur dioxide (SO₂) under the Cross-State Air Pollution Rule. Benson is therefore required to continuously monitor and report Unit BLR-1’s SO₂, NO_x, and carbon dioxide (CO₂) mass emissions, NO_x emission rate, and heat input rate in accordance with 40 CFR part 75. To meet these monitoring requirements, Benson has installed continuous emission monitoring systems (CEMS) for SO₂, NO_x, CO₂, and stack gas flow rate.

The methodologies used by Benson to determine reported NO_x emission rate and heat input rate data require the use of an F_c value – a factor representing the amount of CO₂ produced by combustion of a given quantity of heat input from a given type of fuel, expressed in standard cubic feet per million Btu (scf CO₂/mmBtu).¹ For the most common fuels, including propane and wood, Table 1 in section 3.3.5 of appendix F to part 75 provides default F_c values and sections 3.3.6 through 3.3.6.2 provide a methodology for determining optional site-specific F_c values. Section 3.3.6.4 provides a methodology to determine a prorated F_c value for a blend of listed fuels, and section 3.3.6.5 provides a “worst-case” option to use the highest F_c value determined to be appropriate for any listed fuel combusted at the unit instead of using prorated F_c values. However, if a unit combusts any fuel not listed in Table 1, section 3.3.6.3 requires the

¹ Unit BLR-1’s NO_x mass emissions are computed by multiplying the results of equations for calculating NO_x emission rate and heat input rate, one of which uses an F_c value in the numerator and the other of which uses the same F_c value in the denominator, so the F_c values cancel out in the computation of NO_x mass emissions. The equations used by Benson to compute the unit’s SO₂ and CO₂ mass emissions do not require use of an F_c factor.

unit's owner or operator to obtain EPA approval for a site-specific F_c value for the combination of fuels combusted at the unit through a petition under § 75.66. Because some of Unit BLR-1's fuels are not listed in Table 1, Benson submitted the November 2016 petition and December 2017 revision seeking approval of a general methodology for determining site-specific F_c values for the typical blend of solid fuels combusted at the unit as well as a site-specific F_c value of 1850 scf CO₂/mmBtu for the particular blend of solid fuels combusted at the unit in 2016. Benson also requested approval of an approach for selecting the F_c value to use in calculations for each hour depending on whether propane, wood, a solid fuel blend, or a combination of these fuels and blends is being combusted in the hour.

According to Benson, although it is possible to identify when propane or solid fuel is being combusted at the unit, with the unit's current equipment it is generally not practical to identify the specific proportions of the individual solid fuels being co-fired at any given time. In its petition, Benson has requested approval of an approach for determining and annually updating site-specific F_c values appropriate for the unit's typical blend of wood and biomass fuels rather than site-specific F_c values for each individual type of biomass fuel not listed in Table 1 of appendix F to part 75. Generally, Benson has proposed to (1) annually collect nine samples of the combined wood and biomass fuel blend, which may be collected during the annual relative accuracy test audit (RATA) conducted under part 75, (2) perform analysis of each sample to determine its carbon content and gross calorific value, (3) use Equation F-7b in appendix F to part 75 to compute the F_c value for each sample based on the results of the analysis, and (4) compute the average of the F_c values for the nine annual samples. For 2016 only, Benson collected samples over a two-week period rather than over the course of a RATA and computed an average F_c value of 1850 scf CO₂/mmBtu. The December 2017 revised petition shows the F_c values computed from each of the 2016 and 2017 samples as well as the 2016 and 2017 average F_c values. Benson notes that the average F_c values computed from the 2016 samples and the 2017 samples differ by less than 0.5% and that the F_c values computed from the individual 2016 samples vary by no more than 4% from the 2016 average F_c value, despite large variations in the percentages of wood and poultry litter across the 2016 samples.

In the December 2017 revised petition, Benson proposes to use the F_c value determined from each set of annual samples to report NO_x emissions and heat input starting with the calendar quarter in which the samples were taken and continuing until the next annual test, unless the new average F_c value is lower than the F_c value in use, in which case Benson would continue to use the higher F_c value. Benson proposes to use the site-specific F_c value for the solid fuel blend to calculate reported NO_x emission rate and heat input rate data values for any hour when the unit combusts only the solid fuel blend or combusts a combination of the solid fuel blend and propane, analogous to the "worst-case" option available under section 3.3.6.5 to units combusting only fuels listed in Table 1 of appendix F.

For propane and wood fuels, Benson proposes to use F_c values of 1190 and 1830 scf CO₂/mmBtu, respectively, which are the default F_c values for these fuels in Table 1 of appendix F. Benson proposes to use the F_c value for propane to calculate reported NO_x emission rate and heat input rate data values for any hour in which Unit BLR-1 combusts only propane – typically, periods of start-up. Benson proposes to use the F_c value for wood to calculate reported NO_x emission rate and heat input rate data values for any hour in which the unit combusts only wood or a combination of wood and propane but no other fuel.

EPA's Determination

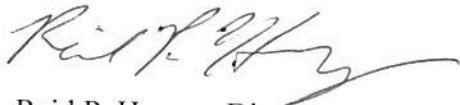
EPA approves, in part, Benson's proposed strategy for determining the appropriate F_c values to use in the calculation of hourly NO_x emission rates and heat input rates for Unit BLR-1 at the Benson Power Biomass Facility. The basis for this approval is (1) the similarity of the proposed strategy to the procedures that are required or allowed when a unit combusts a combination of fuels listed in Table 1 of appendix F to part 75, and (2) the low variability in the F_c values that were computed from the individual 2016 samples reflecting a wide range of percentages of wood and poultry litter in the solid fuel blend. The terms and conditions of this approval are as follows:

- (1) For each unit operating hour or partial hour in which propane gas is the only fuel combusted in Unit BLR-1, Benson shall calculate the hourly NO_x emission rates and heat input rates using the default F_c value of 1190 scf CO₂/mmBtu for propane from Table 1 of appendix F to part 75.
- (2) If and when Benson adds the capability to identify the proportions of the individual solid fuels being combusted at Unit BLR-1 at any time, or in any calendar quarter in which the only solid fuel combusted at the unit is wood, for each unit operating hour or partial hour in which wood is combusted either as the only fuel or with propane and no other fuel, Benson shall calculate the hourly NO_x emission rates and heat input rates using the default F_c value of 1830 scf CO₂/mmBtu for wood from Table 1 of appendix F to part 75. If Benson has not added the capability to identify the proportions of the individual solid fuels being combusted at any time, then in any calendar quarter in which the unit combusts more than one type of solid fuel the default F_c value for wood shall not be applicable, and Benson shall calculate the hourly NO_x emission rates and heat input rates as provided in paragraph (3) in hours or partial hours when the unit combusts any solid fuel.
- (3) Except as provided in paragraph (2), for each unit operating hour or partial hour in which any fuel other than propane is combusted, Benson shall calculate the hourly NO_x emission rates and heat input rates using the site-specific F_c value determined in accordance with paragraphs (4) and (5) below.
- (4) For each calendar year in which fuels other than propane and wood are combusted in Unit BLR-1, Benson shall perform fuel sampling and analysis as follows to determine a site-specific F_c value. Each calendar year, Benson shall obtain at least nine representative samples of the blended solid fuels combusted at the unit (e.g., poultry litter, wood, other biomass materials) either during the RATA for part 75 or whenever the blend of fuels is being fired over the course of the calendar year. Each of the samples shall be analyzed for carbon content (weight percentage) and gross calorific value (Btu/lb). Based on the results of the analysis, Equation F-7b in appendix F to part 75 shall be used to calculate the F_c value for each sample. The F_c values for each of the samples collected in a given calendar year shall be arithmetically averaged to determine the F_c value used prospectively from the date of the last of the samples, unless the new average site-specific F_c value is lower than the site-specific F_c value already in use, in which case either the newly calculated average F_c value may be used or the previous F_c value may continue to be used until the next annual determination.

(5) EPA approves the use of a site-specific F_c value of 1850 scf CO₂/mmBtu for any hour in the 2nd, 3rd and 4th quarters of 2016 when a blend of poultry litter and wood was combusted in Unit BLR-1. As necessary, Benson must resubmit the electronic data reports for BLR-1 for the 2nd, 3rd and 4th quarters of 2016. Benson shall continue to use the site-specific value of 1850 scf CO₂/mmBtu to calculate reported NO_x emission rate and heat input rate for unit operating hours through June 7, 2017. Beginning June 8, 2017, EPA approves the use of a site-specific F_c value of 1857 scf CO₂/mmBtu for any hour when a blend of poultry litter and wood are combusted until the date in which sufficient samples are collected in calendar year 2018 to re-determine the site-specific F_c value.

EPA's determination relies on the accuracy and completeness of Benson's November 3, 2016 petition and December 13, 2017 revised petition and is appealable under 40 CFR part 78. If you have any questions regarding this determination, please contact Louis Nichols at (202) 343-9008. Thank you for your continued cooperation.

Sincerely,



Reid P. Harvey, Director
Clean Air Markets Division

cc: Kevin Vuilleumier, EPA Region 5
Sabrina Argentieri, EPA Region 5
Marc Severin, MNPCA
Louis Nichols, EPA, CAMD