1/19/2012

Mr. Malcolm Carroll
Designated Representative
Borger Energy Associates, LP
Blackhawk Station
P.O. Box 29
Borger, TX 79008

Re: Petition for Approval of Site-specific F-Factors for Refinery Fuel Gas and an F-Factor Prorating Procedure for Units 001 and 002 at the Blackhawk Power Station (Facility ID (ORISPL) 55064)

Dear Mr. Carroll:

The United States Environmental Protection Agency (EPA) has reviewed the February 16, 2011 petition submitted under § 75.66 by Borger Energy Associates, LP (BEA) and the supplementary information provided on September 26, 2011, in which BEA requested approval of site-specific F-factors and a procedure for determining prorated F-factors, for Units 001 and 002 at the Blackhawk Power Station (Blackhawk). EPA approves the petition, with conditions, as discussed below.

Background

BEA owns and operates the Blackhawk Power Station, which is a cogeneration facility located on leased property within the WRB Refinery, in Borger, Texas. The facility consists of two identical Westinghouse Model 501D5A gas turbine/heat recovery steam generator (HRSG) systems, known as Units 001 and 002, each of which exhausts to a separate stack. Each turbine has a nominal capacity of 115 megawatts (MW). Supplemental heat is provided to each HRSG by means of a duct burner. The gas turbines started operation in the simple-cycle mode in September 1998 and switched to the combined-cycle mode in June 1999. The facility combusts natural gas in the gas turbines, and combusts either refinery fuel gas (RFG) or a blend of RFG and natural gas in the duct burners.

According to BEA, Blackhawk Units 001 and 002 are subject to the Acid Rain Program and to the Clean Air Interstate Rule (CAIR) annual trading programs for sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Therefore, BEA is required to continuously monitor and report SO_2 and NO_x mass emissions data and heat input for these units, in accordance with 40 CFR Part 75.

The natural gas combusted at Blackhawk comes primarily from Duke Conoco Phillips (DCP) and is a casing head gas generated from an oil field. The gas is delivered to the DCP Rock

Creek Plant, a refining plant, from which it is distributed to several customers, including Blackhawk. According to BEA, the DCP gas is greater than 70% methane by volume, is limited by contract to a sulfur content of 20 grains/scf, and generally has a gross calorific value (GCV) above 950 British thermal units per standard cubic foot (Btu/scf). The DCP gas is delivered at a low pressure of 70 pounds per square inch (psi) and is compressed to 350 psi before being fired in the turbines.

A secondary source of natural gas comes to Blackhawk through the El Paso Gas Company pipeline, located northeast of Borger, Texas. This gas is delivered at 350 psi and does not have to be compressed before being fired in Units 001 and 002. According to BEA, the GCV of the El Paso gas is measured in the Blackhawk gas yard and is typically around 1,050 Btu/scf. The El Paso gas is burned in small quantities throughout the year and occasionally is combusted as the primary fuel when there are problems with the DCP delivery system.

The DCP and El Paso gas streams are transferred to a common header that distributes the blended gas to Units 001 and 002. According to BEA, the fuel flow rate to each unit is measured, but it is not possible in the current configuration to measure the GCV of the blended gas stream.

The RFG combusted in the duct burners is made up of several process waste gases that are generated at the WRB refinery. These gases are transferred to a mix tank, where natural gas is injected to control the final GCV and hydrogen sulfide (H_2S) content of the RFG. Once the RFG is received at Blackhawk, its H_2S content is measured using a lead acetate spectrometer and its GCV is determined using gas chromatography. The flow rate of RFG to the duct burner of each unit is measured separately.

In 2009, an audit identified the following four issues regarding implementation of the Acid Rain Program at Blackhawk:

(1) *Refinery Fuel Gas Sulfur Content Representation*. Since January 2000, Blackhawk has been using the H_2S content, rather than the total sulfur content, of the RFG in the SO_2 mass emissions calculations for Units 001 and 002. The requirement to use the total sulfur content is specified in 40 CFR Part 75, Appendix D, sections 2.3.3 and 2.3.3.1.1;

(2) *Natural Gas Sulfur Content Representation*. Between January 2000 and December 2009, Blackhawk used the pipeline natural gas default emission factor of 0.0006 lb/MMBtu in the SO_2 mass emissions calculations, without proper documentation to substantiate that the natural gas fired in the turbines qualifies as "pipeline natural gas" under Part 75, Appendix D, sections 2.3.1.1 and 2.3.1.4;

(3) *Natural Gas and Refinery Fuel Gas F-Factor Representation for NO_x Emissions Calculations*. Since October 2000, the facility has been calculating the NO_x emissions for Units 001 and 002 using a single, site-specific dry-basis F-factor ("F_d") value of 7,500 dscf/MMBtu, for both natural gas and RFG, without receiving permission from the

Administrator to use that factor, as required under Part 75, Appendix F, section 3.3.6.3; and

(4) *Refinery Fuel Gas F-Factor Representation for CO_2 Emissions Calculations*. Since January 2000, the facility has been using the default carbon-based F-factor ("F_c") value for natural gas specified in Part 75, Appendix F, section 3.3.5 (i.e., 1040 scf CO_2/MMBtu) to calculate CO_2 mass emissions from the combustion of natural gas and RFG, rather than developing and using a separate F_c value for the RFG.

The February 16, 2011 petition and the supplementary information provided on September 26, 2011 address only two of the above issues, i.e., items (3) and (4).[1] BEA has requested EPA approval to use site-specific F_c and F_d factors for the RFG in the NO_x and CO_2 emissions calculations for Blackhawk Units 001 and 002. BEA has further requested approval of a proposed procedure for prorating and updating these F-factors.

BEA uses Equation F-5 in Part 75, Appendix F to calculate NO_x emission rate[2] (lb/MMBtu) and Equation G-4 in Part 75, Appendix G to calculate CO_2 mass emissions. Both of these equations require the use of fuel-specific F-factors; an F_d value is required for Equation F-5 and an F_c value is needed for Equation G-4. Table 1 in section 3.3.5 of Part 75, Appendix F lists default F-factors for various types of fuel. When a fuel listed in Table 1 is combusted alone in a unit, the owner or operator may either use the default F_c and F_d values from Table 1 to calculate emissions or perform fuel sampling and analysis to determine site-specific F_c and F_d values, as described in section 3.3.6 of Appendix F.

When a combination of fuels listed in Table 1 is combusted, the owner or operator may calculate emissions using either a prorated F-factor (as described in section 3.3.6.4 of Appendix F) or the highest ("worst-case") Table 1 default F-factor for any of the fuels (as described in section 3.3.6.5 of Appendix F). However, for units that combust a combination of fuel listed in Table 1 and other fuel not listed in the table, the F-factor used in the emissions calculations must be approved by the Administrator. This is the case for Blackhawk Units 001 and 002 because the units combust both natural gas, which is listed in Table 1, and RFG, which is not listed in the table.

Since October 2009, BEA has been working with EPA to identify and implement short-term and long-term corrective actions to address the F-factor issues at Blackhawk. In the years prior to 2009, it is estimated that using the aforementioned F_d value of 7,500 dscf/MMBtu in the calculations resulted in NO_x emission rates being under-reported by about 10%. This estimate is based on the default F_d value of 8,710 dscf/MMBtu for natural gas (which is the primary fuel)

[1] BEA intends to submit a second petition to address items (1) and (2) at a later date, pending the outcome of a study to assess the variability in the sulfur content of the RFG.

[2] The actual equation in the monitoring plans of Units 001 and 002 is Equation 19-1, which is found in 40 CFR Part 60, Appendix A-7, Method 19. However, Equation 19-1 and Equation F-5 are identical.

and the results of fuel sampling and analysis provided by BEA on September 26, 2011[3], showing that, on average, the F_d for RFG is about 8,000 dscf/MMBtu.

The CO_2 mass emissions from Units 001 and 002, in contrast to NO_x, have likely been over-reported by 1 to 2% since 2000. The natural gas default F_c value of 1,040 scf CO_2/MMBtu has been used to calculate CO_2 emissions for both natural gas and RFG. The fuel sampling results provided to EPA on September 26, 2011 show that the average F_c for RFG is about 950 scf CO_2/MMBtu, which is considerably lower than the default F_c for natural gas.

In view of these considerations, to ensure that NO_x and CO_2 emissions would not be under-reported in the short-term, EPA instructed BEA to: (1) recalculate the NO_x mass emissions for 2009, using the natural gas default F_d value of 8,710 dscf/mmBtu, for both natural gas and RFG; (2) make no changes to the reported 2009 CO_2 mass emissions, since the default natural gas F_c value of 1,040 scf CO_2/MMBtu was used for both fuels; and (3) resubmit the electronic data reports for all four quarters of 2009. On February 24, 2010, BEA submitted the revised 2009 emissions reports to EPA, as required. In 2010 and 2011, BEA has continued to calculate and report NO_x and CO_2 emissions from Blackhawk Units 001 and 002 using the conservative F_c and F_d factors of 1,040 scf CO_2/MMBtu and 8,710 dscf/mmBtu, for both natural gas and RFG.

In the February 16, 2011 petition and the supplementary information provided on September 26 and October 20, 2011, BEA has proposed the following long-term compliance strategy for Blackhawk Units 001 and 002:

- For natural gas, BEA would continue to use the EPA default F_d and F_c factors of 8,710 dscf/MMBtu and 1,040 scf CO_2/MMBtu in the emissions calculations.

- For RFG, BEA would follow the procedures in section 3.3.6 of Part 75, Appendix F to determine site-specific F_d and F_c factors, at least once every four operating quarters. Each year, nine samples of the RFG would be taken and analyzed, using methods prescribed in sections 3.3.6.1 and 3.3.6.2 of Appendix F. Then, Equations F-7a and F-7b in Appendix F would be used to calculate F_d and F_c values for each sample. The individual F_d and F_c values would be averaged arithmetically, and the average values would be applied to the next calendar year. To initiate this process, the RFG sampling results from June 2011, which were provided to EPA on September 26, 2011, would be applied in 2012. The average F_d and F_c values obtained from these data, when rounded to the nearest integer are, respectively, 7,805 dscf/MMBtu and 937 scf CO_2/MMBtu.

- BEA has requested that EPA not require resubmission of any of the electronic data reports for the years 2000 through 2008, because Units 001 and 002 are not subject to a NO_x emission limitation under the Acid Rain Program, and under CAIR, BEA was not required to hold allowances equal to the units' annual NO_x mass emissions until 2009.

[3] These data were collected and analyzed in 2009, 2010, and 2011. Nine samples of the RFG were analyzed each year.

Other than the possible 10% underestimation of the NO_x emission rates, there are no NO_x compliance issues for these units prior to 2009.

- In the February 16, 2011 petition, BEA stated its intent to recalculate the 2009 and 2010 NO_x and CO_2 emissions for Units 001 and 002 and to resubmit the quarterly electronic data reports for 2009 and 2010. However, an October 20, 2011 e-mail from Mona Johnson to EPA indicates that BEA has reconsidered its position and would prefer not to resubmit those reports.

- Because multiple fuel types (natural gas and RFG) are combusted in Units 001 and 002, the combined NO_x emissions measured at each stack cannot be separated by fuel type. Therefore, the F_d factor used to calculate the hourly NO_x emission rates must be prorated. BEA has proposed to use Equation F-8 in section 3.3.6.4 of Part 75, Appendix F every month to determine a prorated F_d value for each unit, based on the F_d factors for the individual fuels and the fraction of the monthly unit heat input contributed by each fuel type.

- For each calendar month, BEA proposes to use fuel flow and GCV data from two months prior to calculate the fuel-specific heat input fractions (X_i values) required by Equation F-8. BEA has proposed this approach because, for a given calendar month, GCV data for natural gas are not received from the suppliers until 25 days after the end of that month. For example, natural gas GCV data for August, which would not be received until September 25, could not be used to calculate the prorated F_d factor for either August or September. October would be the earliest month for which the August data could be used to calculate F_d.

- Because the DCP and El Paso natural gas streams, which have different GCV values, are combined together before being routed to Units 001 and 002 and (according to BEA) it is not possible to measure the GCV of the combined gas stream in the present configuration, BEA has proposed to determine the monthly heat input to each unit from each type of natural gas as follows:

    - The total facility-wide mixed natural gas flow for each month would be the determined by individually measuring the monthly flow of each type of gas prior to mixing, and summing the results;

    - The monthly flow of mixed natural gas to each unit would be measured with a certified Part 75 fuel flow meter;

    - The monthly flow of each type of natural gas to a particular unit would be based on the percentage of the facility-wide mixed natural gas flow routed to that unit (for instance, if 40% of the monthly facility-wide natural gas flow is routed to Unit 001, it would be assumed that 40% of the total El Paso gas flow for the month is combusted in Unit 001 and 40% of the total DCP gas flow for the month is combusted in Unit 001); and

- Knowing the monthly flow of each type of natural gas to each unit and the corresponding GCV values, the monthly heat input to each unit from each type of natural gas would be determined.

- The monthly heat input to each unit from RFG combustion would be determined using flow rate data from a certified Part 75 fuel flow meter and GCV measurements from a gas chromatograph.

- For each type of gas combusted in Unit 001 or Unit 002 during the month, the heat input fraction (X_i value) required by Equation F-8 would be obtained by dividing the monthly heat input from that gas by the total monthly heat input to the unit.

- The F_c values used in Equation G-4 to calculate the hourly CO_2 mass emissions from Units 001 and 002 would not be prorated because the hourly fuel flow rates and heat input rates for natural gas and RFG are monitored separately. The default F_c value of 1,040 scf/MMBtu would be used for natural gas. For RFG, the F_c value from the most recent annual determination would be used. For each unit, the CO_2 mass emissions would be the sum of the CO_2 mass emissions from the combustion of natural gas and RFG.

EPA's Determination

EPA approves BEA's short-term and long-term strategies for determining NO_x emission rates and CO_2 mass emissions from Blackhawk Units 001 and 002. The terms and conditions of this approval are as follows:

(1) For Units 001 and 002, BEA is not required to resubmit any of the electronic data reports covering the years 2000 through 2010 because:

- Units 001 and 002 are not subject to an annual NO_x emission rate limit under 40 CFR Part 76;
- The requirement under CAIR for BEA to hold allowances equal to the annual NO_x mass emissions from Units 001 and 002 did not become effective until January 1, 2009;
- In 2009 and 2010, the NO_x mass emissions from Units 001 and 002 were calculated using a conservatively high F_d value of 8,710 dscf/MMBtu for all operating hours; therefore, the NO_x mass emissions for those two calendar years were not under-reported; and
- In the years 2000 through 2010, the CO_2 mass emissions from Units 001 and 002 were calculated using a conservatively-high F_c value of 1,040 scf CO_2 /MMBtu for all operating hours; therefore, the CO_2 mass emissions were not under-reported.

(2) For 2011, BEA shall continue to calculate hourly NO_x emission rates and CO_2 mass emissions for Units 001 and 002 using the conservative default F_d and F_c factors of 8,710 dscf/MMBtu and 1,040 scf CO_2 /MMBtu, respectively.

(3) Beginning in 2012, BEA shall calculate NO_x emission rates and CO_2 mass emissions for Units 001 and 002 using the long-term compliance strategy summarized above in the "Background" section of this approval.

(4) To calculate the prorated F_d factor that will be used for a given calendar month, fuel flow measurements and GCV values from two months prior shall be used. Therefore, data from November 2011 shall be used to determine the prorated F_d value for January 2012, data from December 2011 shall be used to determine the prorated F_d value for February 2012, and so on.

(5) The F_d and F_c factors for RFG that were obtained in June 2011, i.e., 7,805 dscf/MMBtu and 937 scf CO_2/MMBtu, respectively, shall be used in 2012 until the next annual determination of these F-factors. If the F_d or F_c value obtained in the next annual determination is less than or equal to the value currently in use, the current value shall continue to be used until an F_d or F_c value higher than the current value is obtained in a subsequent determination.

EPA's determination relies on the accuracy and completeness of BEA's February 16, 2011 petition and the supplementary information provided on September 26 and October 20, 2011, and is appealable under 40 CFR Part 78. If you have any questions regarding this correspondence, 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,

/s/
Richard Haeuber, Acting Director
Clean Air Markets Division

cc: Joyce Johnson, EPA Region VI
Sandy Simko, Texas Commission on Environmental Quality
Carlos R. Martínez, CAMD
Travis Johnson, CAMD
Craig Hillock, CAMD
Kenon Smith, CAMD