September 11, 2008

David A. Ledonne
VP Operations
DEGS Energy Generation Services
139 East Fourth Street
EA502
Cincinnati, OH 45202

Re: Petition to Use a Default F-factor and Site-specific Prorating Procedures for Units 1, 3, and 4 at Duke Energy Generating Services' Tuscola Facility (Facility ID (ORISPL) 55245)

Dear Mr. Ledonne:

The United States Environmental Protection Agency (EPA) has reviewed the January 15, 2008 petition under 40 CFR 75.66, in which Duke Energy Generating Services (DEGS) requested approval of: (1) a default F-factor for combustion of an unconventional fuel in Units 1, 3, and 4 at its Tuscola facility; and (2) site-specific procedures for determining prorated F-factors when combinations of fuels are co-fired in Units 1, 3, and 4. EPA approves the petition, for the reasons discussed below.

Background

DEGS owns and operates three non-electricity generating units (non-EGUs), Units 1, 3, and 4, at its Tuscola, Illinois facility (Tuscola). Units 1, 3, and 4 combust a combination of bituminous coal, natural gas, and "off-gas" in varying proportions to provide steam for a host site. According to DEGS, the off-gas consists of approximately 90 percent ethylene.

According to DEGS, Units 1, 3, and 4 are subject to the NO_x Budget Trading Program. Therefore, DEGS is required to continuously monitor and report ozone season[1] NO_x mass emissions and heat input for Units 1, 3, and 4, in accordance with Subpart H of 40 CFR Part 75. In previous ozone seasons, these units have been monitored individually, even though they share a common stack. However, in 2008, DEGS plans to discontinue unit-level monitoring and to monitor the combined NO_x mass emissions from Units 1, 3, and 4 at the common stack.

When the change is made from unit-level to common stack monitoring, DEGS intends to install and certify a dilution-extractive type NO_x-diluent continuous emission monitoring system (CEMS) and a flow monitor on the common stack. The hourly NO_x emission rates (lb/mmBtu) at the common stack will then be calculated using Equation F-6 in Appendix F of Part 75. Hourly heat input rates will be calculated using Equation F-15, and the hourly NO_x mass

[1] The ozone season extends from May 1st through September 30th of each year.

emissions will be determined using Equation F-24.

Equations F-6 and F-15 both include a carbon-based F-factor term, "F_c". F-factors are fuel-specific. Table 1 in section 3.3.5 of Part 75, Appendix F specifies default F_c values of 1,040 scf CO_2/mmBtu and 1,800 scf CO_2/mmBtu, respectively, for natural gas and bituminous coal. However, there is no F_c value for ethylene in Table 1. According to DEGS, based on the results of fuel sampling and analysis, the F_c factor for pure ethylene is 1270 scf CO_2/mmBtu[2], and the F_c value for the off gas is approximately 1,259 scf CO_2/mmBtu, based on the results of fuel sampling and analysis.

Because coal, natural gas, and off gas are co-fired in varying proportions in Units 1, 3, and 4, the question of which F-factor to use during co-fired hours naturally arises. The standard Part 75 approach for determining F_c values when fuels are co-fired is found in section 3.3.6.4 of Appendix F. A prorated F_c value, weighted according to the fraction of the unit heat input contributed by each fuel, is calculated using Equation F-8 in section 3.3.6.4. However, the use of Equation F-8 is restricted to the combustion of fuels listed in Table 1 of Appendix F. As previously noted, bituminous coal and natural gas are listed in Table 1, but ethylene and offgas are not. According to section 3.3.6.3 of Appendix F, when a fuel listed in Table 1 is combusted in combination with any fuel not listed in the Table, the F_c value is subject to the Administrator's approval under §75.66.

In view of these considerations, on January 15, 2008, DEGS petitioned for approval of the following site-specific methodologies for determining appropriate F-factors for Tuscola Units 1, 3, and 4 during co-fired hours:

(1) First, DEGS proposed to calculate a prorated F_c value for each hour in which natural gas and off gas are co-fired, in the absence of coal. Default F_c values of 1,040scf CO_2/mmBtu for natural gas (from Table 1 in Appendix F of Part 75) and 1,259 scf CO_2/mmBtu for off gas (based on the results of fuel sampling and analysis) would be used in the calculations. A constant heating value of 1,598 Btu/scf (also derived from fuel sampling and analysis) would be used for the off gas, and the heating value of the natural gas would be determined from data provided by the gas supplier. A BTU meter would be used to continuously measure the heating value of the blended gas. Then, each hourly average heating value of the blend would be used to determine a prorated hourly F_c value by linear interpolation between the default F_c factors for natural gas and off gas. DEGS provided a graphical representation of this interpolation procedure as an attachment to the petition; and

(2) Second, when coal is co-fired with natural gas and/or off gas, DEGS proposed to determine hourly prorated F_c values using a carbon balance approach, taking into account the fraction of the total hourly heat input from each type of fuel. However, March 26, 2008 supplemental information from DEGS indicates that DEGS has reconsidered this approach and for simplicity, would prefer to report the default F_c value for bituminous coal (i.e., 1,800 scf CO_2/mmBtu) during these co-fired hours, rather than deriving hourly prorated F-factors.

EPA's Determination

EPA approves DEGS' proposed default F_c value of 1,259 scf CO_2/mmBtu for the off gas combusted in Tuscola Units 1, 3, and 4. Further, the Agency approves the proposed method of determining prorated F_c values when natural gas and off gas are co-fired in Tuscola Units 1, 3, and 4. Finally, EPA approves the use of a default F_c value of 1,800 scf CO_2/mmBtu for all hours in which coal is combusted in the units, either alone or in combination with natural gas and/or off gas. The basis for these approvals is as follows:

1. EPA analyzed the fuel sampling and analysis data provided by DEGS in support of the proposed default F_c value of 1,259 scf CO_2/mmBtu for the off gas combusted in Units 1, 3, and 4. The fuel sampling results are very consistent and confirm that the off gas is about 90 percent ethylene. In view of this, the proposed F_c value of 1,259 scf CO_2/mmBtu appears to be reasonable, when compared against the F_c factor of 1,272 scf CO_2/mmBtu for pure ethylene;

2. Revisions to section 3.3.6.5 of Part 75, Appendix F were published on January 24, 2008 (see 73 FR 4312, 4373-74, Jan. 24, 2008), allowing the owner or operator to report a "worst case" F_c factor in any operating hour in which fuels listed in Table 1 of Appendix F are co-fired. The worst-case F_c factor is the highest F_c value for any of the fuels that are co-fired. As previously noted, DEGS has indicated a preference for using this approach whenever coal is co-fired with natural gas and/or off gas, in lieu of determining hourly prorated F_c values. Although ethylene is not among the fuels listed in Table 1 (which includes only the more commonly-used fuels), using a worst case F_c when co-firing coal and off gas is consistent with the intent of section 3.3.6.5; and

3. The approved F_c values in paragraphs 1 and 2 immediately above will have no impact on the NO_x mass emissions reported from Units 1, 3, and 4. The F_c factor is in the denominator of the NO_x emission rate equation and in the numerator of the heat input rate equation. Therefore, the F_c terms cancel out when these equations are multiplied together to obtain the NO_x mass emissions. Hence, there is no possibility that using the approved F_c value will result in NO_x mass emissions being under reported.

EPA's determination relies on the accuracy and completeness of the information provided by DEGS in the January 15, 2008 petition and in the March 26, 2008 supplemental

information, and is appealable under Part 78. If you have any questions about this determination, please contact Louis Nichols, at (202) 343-9008. Thank you for your continued cooperation.

Sincerely,

/s/
Sam Napolitano, Director
Clean Air Markets Division

cc: Constantine Blathras, EPA Region V
Kevin Mattison, IEPA
Louis Nichols, CAMD