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

MAY 13 2004

OFFICE OF
AIR AND RADIATION

J. L. Blatt
Authorized Account Representative
Union Carbide Corporation
P.O. Box 8004
437 MacCorkle Avenue SW
South Charleston, WV 25303

> Re: Petition to Use a Prorated F-factor Value for South Charleston (Facility ID (ORISPL) 880026), Unit 25

Dear Mr. Blatt:

This is in response to your letter, dated December 15, 2003, in which Union Carbide Corporation (UCC) requested permission to use a prorated F-factor for purposes of reporting nitrogen oxides (NO_x) mass emissions and heat input data for the NO_x Budget Program, under the West Virginia Division of Air Quality (WVDAQ) Series 1 regulation. EPA approves the petition, with conditions, as discussed below.

Background

UCC's South Charleston, West Virginia facility consists of three boilers, Units 25, 26 and 27, which are subject to the NO_x Budget Program requirements of the WVDAQ Series 1 regulation. For Units 25, 26 and 27, this regulation requires UCC to continuously monitor and report ozone season NO_x mass emissions and heat input beginning on May 1, 2003, in accordance with Subpart H of 40 CFR Part 75.

Unit 25 is a coal-fired unit with a rated capacity of 304,000 pounds of steam per hour. The unit combusts primarily bituminous coal and natural gas. Occasionally, process vent gases (i.e., DEK, PDO and POV) and liquid residues are co-fired along with the coal and natural gas. Vent gases and liquid residues account for only about 4% of the total heat input to the unit. UCC uses a dilution extractive NO_x-diluent continuous emission monitoring system (consisting of a NO_x monitor and a CO_2 monitor) and a stack flow monitor to meet the NO_x Budget Program monitoring and reporting requirements for Unit 25. NO_x emission rate (lb/mmBtu) is calculated using Equation F-6 in Appendix F of 40 CFR Part 75, heat input rate is calculated using Equation F-15, and NO_x mass emissions are determined using Equation F-24.

Equations F-6 and F-15 require the use of a carbon-based F-factor (F_c) to determine the

hourly NO_x emission rate and heat input values. Since F-factors are fuel-specific, special consideration must be given to the F_c value when different types of fuels are co-fired. Under Part 75, for co-fired hours the owner or operator may either: (1) use Equation F-8 in Appendix F of Part 75 to determine an F_c factor, prorated according to the fraction of the total unit heat input contributed by each fuel; or (2) use an alternative F_c value approved by EPA. On December 15, 2003, UCC petitioned EPA for permission to use option (1) because Unit 25 burns a combination of fossil fuels and non-traditional fuels, for which there are no established F-factors listed in Table 1 of Appendix F.

In the December 15, 2003 petition, UCC proposed a method of determining a prorated F_c value for each hour of operation of Unit 25, based on the specific combination of fuels combusted in the unit during the hour. The method incorporates fuel flow rates and fuel heating values and consists of the following steps: (1) determining the volume of carbon dioxide in the stack gas (V_{CO2}) from the hourly average stack flow rate and CO_2 concentration measured by the CEMS; (2) setting V_{CO2} equal to the sum of the products of the hourly heat input and the corresponding F_c value for each type of fuel (i.e., $\sum (HI)_i (F_c)_i$) and solving the equation for the heat input from coal combustion; (3) estimating the total heat input to the boiler by summing the contribution from each type of fuel combusted; and (4) using Equation F-8 to calculate the prorated hourly F_c value.

In applying this F-factor proration methodology, UCC proposes to use the standard F_c values for bituminous coal and natural gas from Table 1 in Appendix F of Part 75 (i.e., 1800 scf/mmBtu and 1040 scf/mmBtu, respectively). For the vent gases, UCC proposes to use F_c values derived from data presented to EPA in two previous petition requests dated September 3, 2002 and November 4, 2003[1]. For the liquid residues, UCC proposes to determine the F_c and gross calorific value (GCV) of each residue just prior to combusting it in the unit.

EPA's Determination

EPA has evaluated the F-factor proration methodology proposed by UCC for Unit 25 and finds it to be technically sound. The Agency concurs with UCC that using CEMS data and a CO_2 balance instead of unreliable hourly coal feed rates will provide much better estimates of the heat input from coal combustion and will result in more accurate F_c values. Further, use of the proposed methodology will have no significant impact on the reported NO_x mass emissions from Unit 25, because the F-factor is in the numerator of the NO_x emission rate equation and in the denominator of the heat input rate equation. The F_c values cancel out when these equations are multiplied together to give the NO_x mass emissions.

In view of these considerations, the method is conditionally approved for use. The

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[1] On March 25, 2003, EPA approved the analytical and emission calculation methodologies for vent gas combustion, as proposed by UCC in the September 3, 2002 petition. In the November 4, 2003 petition UCC did not propose to change the analytical or calculation methods, but simply to recalculate the F-factor, because the use of one type of vent gas (PVA) was discontinued and replaced with another (POV).

conditions of approval are as follows:

(1)   For the process vent gases, UCC shall use the F_c values derived using the methodology approved by EPA in the March 25, 2003 response to UCC's September 3, 2002 petition. That is, the F_c values shall be 61,700 scf/mmBtu for DEK, 3,615 scf/mmBtu for PDO, and 1,579 scf/mmBtu for POV.

(2)   When liquid residue combusted in Unit 25, the F_c and GCV values shall be determined for each batch, just prior to combusting the residue. These F_c and GCV values shall be used in the prorated F-factor calculations for each hour that the residue is combusted.

(3)   The flowmeters used to measure the feed rates of the vent gases and liquid residues to Unit 25 shall be calibrated, maintained and operated according to the manufacturer's instructions. These calibration and maintenance procedures shall be included in the quality-assurance (QA) plan required by section 1 of Appendix B to Part 75.

(4)   UCC shall perform formula verification testing to ensure that the equations for calculating the prorated F-factors are properly programmed in the data acquisition and handling system (DAHS). The results of these formula verification tests shall be kept on-site, in a format suitable for inspection and auditing.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by UCC in the December 15, 2003, September 3, 2002 and November 4, 2003 petitions and is appealable under Part 78. If you have any questions about this determination, please contact Robert Vollaro, at (202) 564-9116. Thank you for your continued cooperation.

Sincerely,

Sam Napolitano, Director
Clean Air Markets Division

cc: Jerry Curtin, EPA Region III
       Laura Crowder, West Virginia DEP, Division of Air Quality
       Robert Vollaro, CAMD