



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

MAR 25 2003

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 Default Moisture Constant and F-factor Values for South Charleston
(Facility ID (ORISPL) 880026), Unit 27

Dear Mr. Blatt:

This is in response to your letter, dated September 3, 2002, in which Union Carbide Corporation (UCC) requested approval of a default moisture constant and a default F-factor for purposes of reporting nitrogen oxides (NO_x) mass emissions and heat input data under the NO_x Budget Program, under the West Virginia Division of Air Quality (WVDAQ) Series 1 regulation. EPA approves the petition, for the reasons discussed below.

Background

UCC's South Charleston 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. These regulations require UCC to continuously monitor and report NO_x mass emissions and heat input for Units 25, 26 and 27, in accordance with Subpart H of 40 CFR Part 75.

Unit 27 is a natural gas-fired boiler with a rated capacity of 250,000 pounds of steam per hour. Occasionally, process vent gases are co-fired with natural gas in the boiler. Vent gases account for only about 2% of the total heat input to the unit. UCC plans to use a dry extractive NO_x-diluent continuous emission monitoring system (CEMS) and a stack flow monitor to meet the NO_x Budget Program monitoring and reporting requirements for Unit 27. NO_x emission rate (lb/mmBtu) will be calculated using Equation F-5 in Appendix F of 40 CFR Part 75, heat input rate will be calculated using Equation F-18, and NO_x mass emissions will be determined using Equation F-24.

Equation F-18 requires a correction for stack gas moisture content. According to §§ 75.71 (c)(1) and 75.71 (b)(3), this means that UCC must install, certify, and operate a continuous moisture monitoring system on Unit 27. In the September 3, 2002 petition, UCC requested

permission to use a default moisture constant of 14.3% H₂O, in lieu of installing a moisture monitoring system. However, the proposed moisture value appeared to have been derived from theoretical combustion calculations rather than from actual moisture measurements at Unit 27. In view of this, EPA requested additional information, and on December 5, 2002, UCC provided the results of 41 moisture runs for Unit 27, at various operating loads.

Both Equations F-5 and F-18 have a dry-basis F-factor term (F_d). F-factors are fuel-specific. For natural gas combustion, Part 75 specifies a F_d value of 8,710 dscf/mmBtu. However, no F_d values are given in Part 75 for the types of vent gases combusted in Unit 27. This raises a question as to the appropriate F_d value to use when vent gases and natural gas are co-fired in the unit. In the September 3, 2002 petition, UCC proposed to use a constant F_d value of 9,086 dscf/mmBtu for hours in which natural gas and vent gases are co-fired. The proposed F_d is a pro-rated value, which was derived using Equation F-8 in Appendix F of Part 75, in conjunction with maximum potential vent gas flow rates, fuel sampling data for the vent gases, and representative process data (i.e., average values recorded over a one-year period from October 1, 2000 to September 30, 2001).

EPA's Determination

EPA first analyzed the data provided by UCC in support of the proposed default moisture constant of 14.3% H₂O. The results of the 41 moisture runs ranged from 10.8 to 17.3% H₂O, and averaged 14.2% H₂O, indicating that the moisture constant proposed by UCC approximates the average stack gas moisture content for Unit 27. Of the 41 runs analyzed, 16 were above the mean and 25 below it, and the absolute average deviation from the mean was 1.2% H₂O. The 10th percentile value for the data set was 12.8% H₂O and the 90th percentile value was 16.1% H₂O.

As previously noted, the heat input rate equation, i.e., Equation F-18, is the only equation in the monitoring plan for Unit 27 which requires a moisture correction. Since the moisture term is found in the numerator of the equation, lower moisture values will give higher calculated heat input rates, and vice-versa. Higher heat input rates will result in higher NO_x mass emissions being reported, since in Equation F-24, NO_x mass is the product of NO_x emission rate and heat input rate. Therefore, to provide assurance that NO_x mass emissions will not be underestimated, EPA believes that a conservatively low default moisture constant is more appropriate for Unit 27 than UCC's proposed value of 14.3% H₂O, which approximates the mean value of the moisture data set. In view of this, EPA rejects the default moisture constant proposed by UCC and approves a value of 12.8% H₂O instead, i.e., the 10th percentile value of the data set.

Next, EPA reviewed the data and calculations presented by UCC to justify using a constant F_d value of 9,086 dscf/mmBtu during periods when vent gases and natural gas are co-fired in Unit 27. From the information provided, the Agency was able to reproduce both the F_d values for the individual vent gases and the final result of 9,086 dscf/mmBtu. The proposed F_d value is conservatively high, having been derived using maximum potential flow rates for the vent gases. This would have no impact on the reported NO_x mass emissions from Unit 27, 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, and F_d cancels out when these equations are multiplied together to give NO_x mass. In light of these considerations, EPA approves the use of the proposed F_d value of 9,086 dscf/mmBtu, for periods when natural gas and vent gases are co-fired in Unit 27.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by UCC in the September 3, 2002 petition and on December 5, 2002 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, Acting Director
Clean Air Markets Division

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