

June 20, 2012

Mr. T. J. London
Designated Representative
West Virginia Operations (WVO) Responsible Care Leader
Union Carbide Corporation, South Charleston Plant
P.O. Box 8361
437 MacCorkle Avenue, SW
South Charleston, WV 25303

Re: Petition from Union Carbide to Use Prorated F-factors and a Default Moisture Value for Unit B26 at the South Charleston, WV Plant (Facility ID (ORISPL) 50151)

Dear Mr. London:

The United States Environmental Protection Agency (EPA) has reviewed the December 14, 2011 petition submitted by the Union Carbide Corporation (UCC), in which UCC requested permission to use prorated F-factors and a default moisture value for Unit B26 at its South Charleston, WV facility. EPA approves the petition in part, with conditions, as discussed below.

Background

UCC owns and operates a chemical production plant in South Charleston, West Virginia. Three boilers at the facility, Units B25, B26 and B27, are subject to the Clean Air Interstate Rule (CAIR) nitrogen oxides (NO_x) ozone season trading program, in accordance with West Virginia Division of Air Quality (WVDAQ) Regulation 40. Therefore, UCC is required to continuously monitor and report NO_x mass emissions and heat input for Units B25, B26, and B27 on an ozone season-only basis (as opposed to year-round), in accordance with Subpart H of 40 CFR Part 75.

Unit B26 is a dry-bottom wall-fired boiler with a rated capacity of approximately 250,000 pounds of steam per hour. The unit combusts natural gas as its primary fuel; however, sometime in 2012 UCC intends to begin combusting small amounts of process vent gases (i.e., Gum Base Plant (GBP) (previously known as Polyvinyl Acetate (PVA)) and Propylene Oxide (POV)) for VOC control. During the cold weather months (November through March), UCC also plans to combust small amounts of vaporized natural gas liquid condensate (COND) in Unit B26. The condensate is collected from boiler natural gas feed piping during cold weather months to prevent potentially unsafe operating conditions. UCC estimates that up to 25,000 gallons per year of vaporized natural gas liquid condensate could be combusted in Unit B26.

To meet the Part 75 monitoring requirements for Unit B26, UCC has installed and certified a continuous emission monitoring system (CEMS), consisting of dry extractive NO_x and oxygen (O₂) monitors. The hourly heat input rate to the unit is measured using the methodology in Appendix D of Part 75. Equation F-5 in Appendix F of Part 75 is used to calculate the hourly NO_x emission rates (lb/mmBtu) and Equation D-6 in Appendix D is used to calculate the hourly heat input rate (mmBtu/hr). Hourly NO_x mass emissions (lb/hr) are determined by multiplying together the NO_x emission rate and the heat input rate.

UCC is currently modifying Unit B26 to be able to combust GBP, POV, and COND. As part of this project, UCC will also be discontinuing the use of Appendix D for heat input determination. Instead, a stack gas flow rate monitor will be installed and certified, and data recorded by the flow monitor and the O₂ monitor will be substituted into Equation F-18 in Appendix F of Part 75 to determine the hourly heat input rate to Unit B26.

Equations F-5 and F-18 both include a dry basis F-factor (F_d) term. When combustion of GBP, POV, and COND in Unit B26 begins, multiple fuel types, each having a unique F_d value, could be co-fired in the unit in a given hour. In view of this, UCC has proposed to use Equation F-8 in Appendix F of Part 75 to determine a prorated value of F_d for each operating hour. The F_d would be prorated according to the fraction of the total hourly unit heat input contributed by each type of fuel (i.e., natural gas, GBP, POV and COND, as applicable). The hourly heat input from each fuel would be determined using the measured fuel flow rate together with the fuel's heating value. (See the March 16, 2012 e-mail and attachments from UCC to Charles Frushour).

A correction for stack gas moisture content will be needed in Equation F-18. UCC has proposed to use a default moisture value of 12.8% H₂O for Unit B26, for all operating hours. The proposed default moisture value is identical to a value that EPA approved for Unit B27 on March 25, 2003, in response to a petition from UCC. According to UCC, Units B26 and B27 are identical in design and combust the same fuel types; therefore the approved default moisture value of 12.8% H₂O for Unit B27 should also be appropriate for Unit B26.

EPA's Determination

EPA has reviewed UCC's proposed methodology for determining prorated hourly F_d factors for South Charleston Unit B26. The Agency finds the methodology to be technically sound and approves it for use in Part 75 reporting, subject to the conditions below. Use of the proposed methodology will have no impact on the reported NO_x mass emissions from Unit B26, because the F_d factor is in the numerator of the NO_x emission rate equation (Equation F-5) and in the denominator of the heat input rate equation (Equation F-18). The F_d values therefore cancel out when these equations are multiplied together to give the NO_x mass emissions. However,

EPA notes that the moisture value in Equation F-18 does impact the NO_x mass emissions; the reported NO_x mass emissions will decrease as the moisture percentage increases.

The default moisture value of 12.8% H₂O that was approved for Unit B27 is conservatively low and provides assurance that NO_x mass emissions will not be underestimated. UCC believes that using the same default moisture value for “identical” Unit B26 will provide the same assurance. However, this is not necessarily true. The default moisture value for Unit B27 was based on actual measurements of Unit B27’s stack gas moisture content, but no data has yet been provided for Unit B26 to demonstrate that 12.8% H₂O is an appropriate default moisture value. Therefore, approval of the proposed default moisture value for Unit B26 is subject to the conditions below.

Conditions of Approval

EPA approves UCC’s proposed F_d proration methodology and the proposed default moisture value of 12.8% H₂O for South Charleston Unit B26, provided that the following conditions are met:

- (1) Upon completion of the modifications to Unit B26, Equation F-8 in Appendix F of Part 75 shall be used to calculate prorated, hourly F_d factors for the unit. The following fuel-specific F_d factors shall be used in Equation F-8:
 - For natural gas, use the F_d value from Table 1 in section 3.3.5 of Part 75, Appendix F, i.e., 8,710 dscf/mmBtu.
 - For GBP (previously known as PVA), use the F_d values that were previously approved by EPA for Unit B27. That is, use 17,043 dscf/mmBtu for isopropanol solvent runs and 32,283 dscf/mmBtu for acetone solvent runs.
 - For POV, use the F_d value of 10,876 dscf/mmBtu that was previously approved by EPA for Unit B27.
 - For the COND, the F_d value shall be 8,927 dscf/mmBtu, based on the data provided in Attachment 2 of the December 14, 2011 petition.
- (2) The following fuel heating values shall be used in the calculation of each hourly prorated F_d factor:

- For natural gas, use the monthly heating values (Btu/scf) provided by the fuel supplier. For calendar each month, use the value from the previous month in the calculations.¹
 - For GBP, use the values specified in the supplementary information provided by UCC on May 11, 2012. That is, use 122 Btu/scf for isopropanol solvent runs, and use 43 Btu/scf for acetone solvent runs.¹
 - For POV, and COND, use the values provided in Attachment 3 to the December 14, 2011 petition. That is, for POV use 5,651 Btu/lb, and for COND, use 21,066 Btu/lb.²
- (3) The fraction of the total hourly unit heat input contributed by each type of fuel (i.e., the term X_i in Equation F-8) shall be determined as follows. Calculate the hourly heat input from the fuel by multiplying its measured flow rate times its heating value. Then, divide the result by the total hourly heat input from all fuels.
- (4) The flow meters used to measure the feed rates of the natural gas and vent gases shall be operated, maintained, and calibrated according to the manufacturer's instructions. These procedures shall be included in the unit's quality assurance/quality control (QA/QC) program, in accordance with Part 75, Appendix B, section 1.
- (5) UCC shall perform formula verification to ensure that the prorated F_d -factors are being calculated correctly by the data acquisition and handling system (DAHS). The results of these tests shall be kept on-site, in a format suitable for inspection and auditing.
- (6) At least once per calendar year UCC shall measure the stack gas moisture content at Unit B26. A minimum of three test runs must be performed, either using EPA Method 4 in Appendix A-3 of 40 CFR Part 60 or the approximation method described in section 8.2 and illustrated in Figure 4-2 of Method 4.³ If the approximation method is used, measurement at a single point located at least one meter from the stack wall is acceptable.

¹ The flow rates of natural gas and GBP will be measured volumetrically (scfh); therefore, the heating values are expressed in Btu/scf.

² The flow rates of POV and COND will be measured on a mass basis (lb/hr); therefore, the heating values are expressed in Btu/lb.

³ Question 8.26 in the "Part 75 Emissions Monitoring Policy Manual" allows the approximation method to be used as an alternative to regular Method 4.

- (7) The first set of moisture test runs for Unit B26 shall be performed no later than December 31, 2012.
- (8) UCC shall use a default moisture value of 12.8% H₂O in Equation F-18, starting with the first hour in which Unit B26 operates after the modifications to the unit are completed until the hour in which the first set of moisture test runs is completed.
- (9) If the arithmetic average of the first set of moisture test runs is less than 12.8% H₂O, UCC shall begin using the average value from the testing, starting with the first operating hour after the hour of the last moisture run, and the electronic monitoring plan shall be updated to reflect the new default moisture value.
- (10) If, upon completion of any subsequent 3-run moisture testing the average moisture percentage is determined to be less than the default moisture value currently in use, UCC shall use the average value from the testing, starting with the first operating hour after the hour of the last moisture run, and shall update the electronic monitoring plan accordingly.

EPA's determination relies on the accuracy and completeness of UCC's December 14, 2011 petition, the subsequent e-mails dated February 10 and 13, March 6, 13, and 14, and April 27, 2012, and the supplementary information provided by UCC on May 11, 2012 and is appealable under 40 CFR Part 78. If you have any questions regarding this determination, please contact Charles Frushour at (202) 343-9847. Thank you for your continued cooperation.

Sincerely,

/s/

Richard Haeuber, Acting Director
Clean Air Markets Division

cc: Leonard Hotham, EPA Region III
Edward S. Andrews, West Virginia DEP
Charles Frushour, CAMD