



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

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OFFICE OF  
AIR AND RADIATION

Martin L. Bowling, Jr.  
Designated Representative  
Dominion Energy & Dominion Generation  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060

Re: Request to Use the Wet Bulb-Dry Bulb Technique to Correct Emission Rates for Moisture, at Dominion Energy's Clover Power Station (Facility ID (ORISPL) 7213) and at Other Facilities with Wet Scrubbers

Dear Mr. Bowling:

This is in response to your March 24, 2003 petition under §75.66, in which Dominion Energy & Dominion Generation (Dominion) requested permission to use the wet bulb-dry bulb technique to make moisture corrections to sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and carbon dioxide (CO<sub>2</sub>) emissions data at the Clover Power Station and at other Dominion Energy facilities that use wet scrubbers to control SO<sub>2</sub> emissions. EPA approves the petition, with conditions, as discussed below.

### Background

Dominion owns and operates two coal-fired boilers, Units 1 and 2, at its Clover, Virginia facility (Clover). Clover Units 1 and 2 are subject to the Acid Rain Program and Dominion is required to continuously monitor and report SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> emissions data and heat input for these boilers, in accordance with 40 CFR Part 75. Units 1 and 2 are equipped with wet scrubbers to reduce SO<sub>2</sub> emissions. A number of Dominion's Acid Rain Program-affected units at other generating stations also use wet scrubbers for SO<sub>2</sub> control.

Appendix B to Part 75 requires periodic quality-assurance testing of all continuous emission monitoring systems (CEMS) required by the Acid Rain Program. One of the required tests is a relative accuracy test audit (RATA). When the RATA of an SO<sub>2</sub>, NO<sub>x</sub>, or CO<sub>2</sub> monitoring system is performed, corrections to the test data are sometimes required to account for the stack gas moisture content. For the RATA of a flow monitor, moisture measurements are

always required for the purpose of calculating the stack gas molecular weight.

For flow RATAs, §75.22(a) allows the owner or operator to either use EPA Reference Method 4 (in Appendix A of 40 CFR Part 60) or a simpler technique, known as the wet bulb-dry bulb method for moisture determinations. However, for the RATAs of gas monitors, §75.22(a) requires Method 4 to be used to correct SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> concentrations from a wet basis to a dry basis (or vice-versa), and does not allow the wet bulb-dry bulb method to be used for this purpose.

In the March 24, 2003 petition, Dominion requested permission to use the wet bulb-dry bulb technique, on a limited basis, to make moisture corrections to the SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> concentrations measured during RATA testing. Specifically, Dominion proposed to use the wet bulb-dry bulb method only at affected units equipped with SO<sub>2</sub> scrubbers.

To support the petition, Dominion submitted the results of gas monitor RATAs that were performed in January, 2003 on Units 1 and 2 at the Clover generating station. During each RATA run, concurrent moisture data were collected using EPA Method 4 and the wet bulb-dry bulb method. A total of 18 paired data points were obtained, i.e., one for each run, directly comparing the two moisture measurement methods.

Two relative accuracy (RA) calculations were then performed for each pollutant (i.e., two each for SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub>). One RA calculation was done using the Method 4 results, and the other using the wet bulb-dry bulb data. For each pollutant, good agreement was obtained between the two calculated RA percentages. According to Dominion, these results demonstrate that the wet bulb-dry bulb technique is an appropriate alternative to Method 4 for determining the stack gas moisture content at a scrubbed unit.

#### EPA's Determination

EPA analyzed the RATA results submitted by Dominion in support of the March 3, 2003 petition. In general, the data for the 18 individual RATA runs show consistent agreement between Method 4 and the wet bulb-dry bulb method. For the Unit 1 RATA runs, the deviations of the wet bulb-dry bulb results from Method 4 ranged from - 0.03 to + 0.57% H<sub>2</sub>O, and averaged 0.24% H<sub>2</sub>O. For the Unit 2 RATA runs, the deviations ranged from - 0.31 to +0.90% H<sub>2</sub>O, and averaged 0.22% H<sub>2</sub>O.

For the comparative relative accuracy (RA) calculations, all of the RA percentages based on the wet bulb-dry bulb method were either equal to or slightly higher than the corresponding RA percentages obtained using Method 4. For the six data pairs (i.e., two each for SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub>), the average difference between the corresponding relative accuracy percentages was 0.14% RA, and the highest difference for any individual data pair was 0.5% RA.

These results clearly indicate that the wet bulb-dry bulb technique is capable of giving

accurate moisture measurements (within about 0.2% H<sub>2</sub>O of Method 4) at test locations downstream of wet scrubbers. It also appears that the use of this technique does not result in the obtainment of relative accuracy percentages lower than those obtained under identical conditions using Method 4.

However, these demonstration data alone are not a sufficient basis upon which to approve the wet bulb-dry bulb technique for making moisture corrections of SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> emissions data at scrubbed units. To obtain good results with the wet bulb-dry bulb method, the technique must be performed in a consistent manner. Also, quality assurance of the temperature measurement devices is essential. At the present time, there are no established procedures in the Part 75 or Part 60 CEM regulations, either for performing or for quality-assuring the wet bulb-dry bulb method.

In view of this, EPA requested that Dominion develop a protocol explaining the stepwise procedures that were used to make the wet bulb-dry bulb measurements at Clover, and describing the quality-assurance procedures that were used. On September 10, 2003, Dominion submitted a protocol, entitled "Wet and Dry Bulb" to EPA for review. Dominion assigned a procedure number of GS-WDB-1 to the protocol. The Agency reviewed the protocol and found it to be technically sound and sufficiently detailed to ensure that consistent results will be obtained with the wet bulb-dry bulb method.

EPA therefore conditionally approves Dominion's March 24, 2003 petition request to use the wet bulb-dry bulb method to make moisture corrections to SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> emissions data recorded during RATAs. The conditions of approval are as follows:

- (1) The wet bulb-dry bulb method shall only be used to correct SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> emissions data for moisture at units equipped with SO<sub>2</sub> scrubbers; and
- (2) The stepwise measurement procedures and the quality assurance provisions of protocol GS-WDB-1 shall be strictly followed each time the wet bulb-dry bulb method is used as described in (1), above; and
- (3) For each RATA in which the wet bulb-dry bulb method is used as described in (1), above, Dominion shall keep the following records on-site, in a format suitable for auditing and inspection, and shall include this information in the hardcopy test report described in §75.60(b)(6), if such a report is requested by the EPA Regional Office or by the State air pollution control agency:
  - (A) Documentation that the procedures of protocol GS-WDB-1 were followed during the RATA;
  - (B) All of the raw data, i.e., the temperature and barometric pressure measurements made with the wet bulb-dry bulb method;

- (C) Example calculations, showing how the moisture percentages were derived from the raw data;
- (D) The results of the pre-test and post-test quality-assurance tests of the thermocouples;
- (E) The results of any quality-assurance tests of the pressure transmitter or micromanometer used to determine barometric pressure;
- (F) A copy of protocol GS-WDB-1; and
- (G) A copy of this petition approval.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by Dominion in the March 24, 2003 petition and in the supplementary protocol submitted on September 10, 2003 and is appealable under Part 78. If you have any questions about this determination, please contact Robert Vollaro, at (202) 343-9116. Thank you for your continued cooperation.

Sincerely,



Sam Napolitano, Director  
Clean Air Markets Division

cc: Jerry Curtin, EPA Region III  
Frank Adams, Virginia DEQ  
Laura Crowder, West Virginia DAQ  
Robert Vollaro, CAMD