



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

MAR 15 2004

OFFICE OF  
AIR AND RADIATION

Mr. Michael R. Stewart  
Designated Representative  
Engeneration Operating Services, LLC  
Elizabethtown Power  
P.O. Box 1899  
3100 West Broad Street  
Elizabethtown, NC 28337-1899

Re: Petition to Use Site-Specific Default Moisture Values for the Elizabethtown and Lumberton Power Plants (Facility IDs (ORISPL) 10380 and 10382).

Dear Mr. Stewart:

The United States Environmental Protection Agency (EPA) has reviewed the petition submitted under §75.66(a) by Engeneration Generation and Transmission Association, Inc. (Engeneration) on December 26, 2003. In the petition, Engeneration requested permission to use default moisture values in lieu of continuous moisture monitoring, for the purpose of making moisture corrections to the emissions data from its Elizabethtown and Lumberton Power Plants. EPA approves the petition, with conditions, as discussed below.

Background

Engeneration owns and operates four identical coal-fired boilers, i.e., Units 1 and 2 at the Elizabethtown, North Carolina Power Plant and Units 1 and 2 at the Lumberton, North Carolina Power Plant. At each facility, the two units discharge to the atmosphere through a common stack. The units are subject to the Acid Rain Program. Therefore, Engeneration is required to continuously monitor and report sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and carbon dioxide (CO<sub>2</sub>) emissions and heat input for these units, in accordance with 40 CFR Part 75. All four of the units have been permitted to combust either coal alone or a mixture of coal and tire-derived fuel (TDF), with up to 40 percent TDF in the mixture.

Engeneration uses a dry-basis SO<sub>2</sub> monitoring system and a wet-basis stack flow monitor to determine SO<sub>2</sub> mass emissions for each of the four units in question. When using this

monitoring arrangement, a correction for stack gas moisture is needed to properly calculate the SO<sub>2</sub> emissions. Similarly, moisture corrections are needed to determine CO<sub>2</sub> mass emissions and heat input, since the CO<sub>2</sub> monitor measures on a dry basis. Part 75 provides two options for determining the stack gas moisture content. The owner or operator may either report an appropriate fuel-specific default moisture value, as provided in §75.11(b), or, if this option is not viable, a continuous moisture monitoring system must be installed, certified, maintained and operated. Since the rule does not provide a default moisture value for TDF, Engeneration is required to install, certify, maintain and operate a moisture continuous emission monitoring system (CEMS).

Engeneration uses wet and dry-basis oxygen (O<sub>2</sub>) monitors to determine the moisture content of the stack gas at the Elizabethtown and Lumberton facilities. Significant problems have been encountered with the accuracy and stability of these moisture monitoring systems, which were installed and certified by a previous owner. Lumberton and Elizabethtown personnel have worked with vendors, testers and consultants in numerous, largely unsuccessful attempts to improve the moisture monitors' performance and to evaluate possible alternative solutions. As a result of these difficulties, Engeneration has become convinced that the moisture monitors at Elizabethtown and Lumberton cannot generate consistently reliable data.

There are a number of inherent problems associated with the use of a wet/dry O<sub>2</sub> moisture monitoring system. First, the system does not measure moisture directly (the % H<sub>2</sub>O must be calculated from the wet and dry O<sub>2</sub> readings). Second, the reference gases used to calibrate the system are dry and do not challenge the monitoring system to the same extent as the stack gas. Therefore, a true check of the moisture measurement accuracy is not performed during the daily calibrations. Third, the moisture calculations are very sensitive to drift and error in the O<sub>2</sub> measurements. Even a slight drift in the O<sub>2</sub> measurements can cause a significant error in the percent moisture value. For example, if the wet and dry O<sub>2</sub> readings are 6.6 and 7.1 % O<sub>2</sub>, respectively, the calculated moisture is 7.0 % H<sub>2</sub>O. However, a drift of 0.1 % O<sub>2</sub> in the two oxygen readings in opposite directions, such that the wet and dry readings are 6.5 and 7.2 % O<sub>2</sub>, respectively, gives a calculated moisture value of 9.7 % H<sub>2</sub>O, which is 39 percent higher. Lumberton and Elizabethtown personnel have found that, because of the impact of these small drifts, even though a wet/dry O<sub>2</sub> system may pass a relative accuracy test audit (RATA), there can be significant on-going quality assurance issues. In view of this, Engeneration believes that the only reasonable solution is to use a conservative default moisture value for Part 75 emissions calculations and reporting purposes.

In the December 26, 2003 petition, Engeneration proposed to use the default moisture value for bituminous coal from §75.11(b)(1), i.e., 6.0 % H<sub>2</sub>O, for all operating hours of the Elizabethtown and Lumberton facilities. Engeneration believes that using the default moisture value for coal will result in conservatively high SO<sub>2</sub> mass emissions, CO<sub>2</sub> mass emissions and heat input values being reported, when coal is combusted alone and when it is co-fired with TDF. To demonstrate this, Engeneration first performed fuel analyses of the coal, TDF, and coal/TDF mixtures typically combusted at Lumberton and Elizabethtown. The results of the analyses,

which were submitted as an attachment to the December 26, 2003 petition, show no appreciable difference between the pure coal and coal/TDF mixtures, in either the entrained moisture content or in the hydrogen content (which are the two principal factors that determine the moisture content of the stack gas). The average entrained moisture was 4.16 % for coal and 4.34 % for the coal/TDF mixtures. The average hydrogen content for the pure coal was 5.25 % and 5.43 % for the mixtures. Thus, the stack gas moisture content for combustion of mixtures of TDF and coal should be about the same as for pure coal combustion.

Second, Engeneration performed an analysis of moisture data from a 2<sup>nd</sup> quarter, 2003 relative accuracy test audit (RATA) at the Lumberton plant. A mixture of 85 % coal and 15 % TDF was combusted during the RATA testing. The test data indicate that the exhaust gas moisture content at high load averaged 7.9 % H<sub>2</sub>O. At mid load, the average moisture concentration was 7.3 % H<sub>2</sub>O, and at low load, the moisture content averaged 5.8 % H<sub>2</sub>O. Note that at low load the average moisture values were lower than at the other load levels due to the typical increase in combustion air (relative to fuel) in the boilers at low load.

Finally, in order to evaluate the effects of using the proposed default moisture value, Engeneration recalculated the 1<sup>st</sup> and 2<sup>nd</sup> quarter, 2003 SO<sub>2</sub> emissions for the Elizabethtown and Lumberton facilities. In the recalculations, Engeneration replaced the hourly moisture readings from the wet/dry O<sub>2</sub> monitoring systems with the proposed default moisture value of 6.0 % H<sub>2</sub>O. The results of the recalculations show that at the mid and high load levels (where more than 80 % of the emissions occur), the SO<sub>2</sub> emissions increased by 1.6 to 1.8 % when the proposed default moisture value was used. Therefore, Engeneration believes that using a default moisture value of 6.0 % H<sub>2</sub>O will result in over-reporting of emissions by approximately 1.6 to 1.8 %.

#### EPA's Determination

EPA performed an independent analysis of the moisture data from the 2<sup>nd</sup> quarter, 2003 RATA tests of the Lumberton Plant. A total of 14 moisture runs were performed (10 runs at the high load, 2 runs at mid load, and 2 runs at low load). The percent moisture values ranged from 5.5 to 8.5 % H<sub>2</sub>O, with a mean value of 7.6 % H<sub>2</sub>O. Only one data point, at the low load level, was below the proposed default moisture value of 6.0 % H<sub>2</sub>O. The absolute average deviation from the mean value was 0.1 % H<sub>2</sub>O. These results indicate that it is more than 90 percent probable that the stack gas moisture content will be greater than 6.0 % H<sub>2</sub>O when a mixture of coal and TDF is combusted in the Lumberton units. EPA believes that this conclusion can be reasonably applied to the Elizabethtown units since the boilers are identical to those at Lumberton and combust the same fuels.

The mean moisture value from the RATA testing (7.6 % H<sub>2</sub>O) is 1.6 % H<sub>2</sub>O higher than the default value proposed by Engeneration. When moisture corrections are made to emissions data, a difference of 1 % H<sub>2</sub>O in the reported moisture value will result in a corresponding 1 % increase or decrease in the reported emissions. Therefore, it appears that using the proposed 6.0

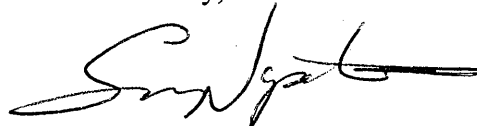
% H<sub>2</sub>O default moisture value in the emissions and heat input calculations<sup>1</sup> for Lumberton and Elizabethtown will yield emissions and heat input values that are conservatively high by about 1.6 percent. This is consistent with the results of Engeneration's recalculation of the 1<sup>st</sup> and 2<sup>nd</sup> quarter, 2003 SO<sub>2</sub> emissions data from the two facilities.

In view of these considerations, EPA approves the use of a 6.0 % H<sub>2</sub>O default moisture percentage for the Elizabethtown and Lumberton Power Plants, under all process conditions. The Agency believes that this default moisture value is sufficiently conservative to ensure that emissions and heat input will not be underestimated.

As a condition of approval, Engeneration shall re-evaluate the appropriateness of the moisture default value each year, during the annual relative accuracy test audits (RATAs) at Lumberton and Elizabethtown. Provided that the average percent moisture measured at any load level during the RATAs either: (1) is greater than or equal to the approved default moisture value or (2) is no more than 1.0 % H<sub>2</sub>O less than the approved value, the approved value shall continue to be used. However, if the average percent moisture measured at any load level is more than 1.0 % H<sub>2</sub>O lower than the approved default value, the average value from that load level shall become the new approved value, and shall be used at both affected facilities, beginning no later than one week after the results of the moisture tests have been received.

EPA's determination relies on the accuracy and completeness of Engeneration's December 26, 2003 petition and the supplementary information provided by Engeneration in support of the petition, and is appealable under Part 78. If you have any questions regarding this determination, please contact Manuel Oliva at (202) 343-9009.

Sincerely,



Samuel Napolitano, Acting Director  
Clean Air Markets Division

cc: Manuel J. Oliva, USEPA CAMD  
Wilson Haynes, USEPA Region IV  
Richard R. Simpson, NCDENR

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<sup>1</sup> The Elizabethtown and Lumberton facilities use Equation F-2 from Appendix F of Part 75 to calculate SO<sub>2</sub> and CO<sub>2</sub> mass emissions and Equation F-16 for heat input rate. In both equations, the emissions or heat input rates increase as the moisture content decreases.