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

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AUG 27 2008

Mr. Basil G. Constantelos
Managing Director Environmental Services and
Designated Representative
Will County Generating Station
Midwest Generation EME, Inc
One Financial Place
440 South LaSalle Street
Suite 3500
Chicago, IL 60605

OFFICE OF
AIR AND RADIATION

Re: Petition for Approval of Alternative Data Substitution Methodology for the Will County Generating Station (Facility ID (ORISPL) 000884)

Dear Mr. Constantelos:

The United States Environmental Protection Agency (EPA) has reviewed the petition submitted under §75.66(a) by Midwest Generation EME, Inc (Midwest) on June 12, 2008, in which Midwest requested approval to use an alternative data substitution methodology to replace SO_2, NO_x, and CO_2 concentration data from January 17 through March 3, 2007 for Unit 3 at Will County Generating Station, in order to correct the data for a low bias that was caused by a suspected probe leak. EPA approves the petition, with conditions, as discussed below.

Background

Unit 3 at Midwest's Will County Station in Chicago, Illinois is a coal-burning, tangentially-fired 290 megawatt boiler. According to Midwest, Unit 3 is subject to the Acid Rain and NOx Budget Programs and is required to monitor and report sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon dioxide (CO_2) emissions and heat input data for the unit in accordance with 40 CFR Part 75. To meet the SO_2, NO_x, and CO_2 monitoring requirements of Part 75, Midwest uses an in-stack dilution extractive continuous emissions monitoring system (CEMS).

On February 27, 2008, Midwest received a notice from EPA that Unit 3 at the Will County Generating Station had been identified in an Agency audit as possibly having a leak at the probe of the CEMS. Midwest conducted an investigation and believed that the CO_2 values had dropped due to the in-leakage of air from leaky ductwork. An analysis by EPA suggested that the flow through the duct had not increased significantly during the time in question and that the low CO_2 values were more likely to have been caused by a leak in the dilution probe. The influx of ambient air from a leak in the probe or its calibration lines would cause an increase in the dilution ratio, which would bias the pollutant gas concentrations readings low. The monitors

continued to pass daily calibrations and linearity checks because the calibration gases are injected under positive pressure, which pushed the ambient air out of the calibration gas line during the calibration sequence. Midwest continued its investigation and determined that the probe was leaking. After March 4, 2007 when Unit 3 went offline for an outage, Midwest replaced all the analyzers and the CO_2 values went back to the normal range. Midwest believes that the probe leak was resolved at that time.

The alternative substitute data that Midwest requested to use to replace the CEMS data from January 17 to March 1, 2007, are based on the assumption that CEMS data can be directly correlated with other operating parameters, such as unit load and CO_2 concentration, making it possible to use a simple multiplier to correct the low bias in the CEMS data. Midwest proposed to apply two bias-correction factors to the SO_2, NO_x, and CO_2 data recorded in the period from January 17 through March 1, 2007. A correction factor of 1.24 would be applied from January 17 to February 8, 2007. A second correction factor of 1.29 would be applied from February 9 to March 1, 2007. To derive these correction factors, Midwest first identified three distinct periods of time, one before the probe leak, and two after the leak, during which Unit 3 was operated in load-bin nine (which is the ninth load bin when unit load is divided into 10 equal bins). Midwest recommended the upward adjustment of the CEMS data, using two different correction factors, one for each time period after the leak. Using the correction factors, Midwest estimated that the SO_2 mass emissions in the first quarter of 2007 would be increased by 146 tons, which is less than 4% of the quarterly total mass originally reported. Midwest also estimated that after the correction factors were applied that the NO_x mass would increase by 40 tons or 4% of the quarterly total mass originally reported.

EPA's Determination

To assess the appropriateness of Midwest's proposed correction factor, EPA performed an analysis of the CEMS data focusing on the CO_2 concentration at a representative load. The CO_2 data were selected for the analysis because of the relatively low variability of CO_2 concentration in a given load range, as compared to other parameters that vary more due to fuel variability or due to other factors in the combustion process. Therefore, differences in CO_2 concentration may be used to derive an appropriate bias correction factor when a uniform bias can be detected. EPA's analysis compared the low-biased CO_2 data recorded from January 17 to March 3, 2007 to a baseline period of quality-assured CO_2 concentration data collected following the most recent CO_2 relative accuracy test audit (RATA). To eliminate operational variation, EPA focused its analysis on the load bin for which the unit was most often operated during the evaluated period (i.e., load bin "9"). The baseline period (July 13 through August 22, 2006) was selected to give 30 days worth of data where at least six hours of quality-assured data per day were collected when the unit was operated within the desired load bin for the analysis. For each day where these criteria were met, the average CO_2 concentration for that load bin was calculated. Then the average daily average CO_2 concentration and standard deviation of the daily averages was calculated resulting in a baseline expected CO_2 concentration of 11.04 %CO_2 with a standard

deviation of 0.14 %CO_2.

Next, EPA calculated daily average CO_2 concentrations in load bin "9", for each day in the period (January 17 through March 3, 2007). A bias correction factor was calculated for this time period by dividing the baseline daily average CO_2 value by the daily average CO_2 concentration calculated for the biased period. To account for the uncertainty of the calculated correction factor and any additional variability caused by the leak, EPA calculated the standard deviation of the daily averages during the biased period and used that value in combination with the standard deviation calculated for the baseline data to calculate an overall uncertainty for the calculated correction factor. This uncertainty was then added to the base correction factor to derive the final correction factor, which ensures that the corrections are conservative and that the corrected data will be reasonably overstated. The following formula demonstrates how this calculation was made.[1]

$$CF = \frac{x \pm dx}{y \pm dy} = \frac{x}{y}\left(1 \pm \sqrt{\left(\frac{dx}{x}\right)^2 + \left(\frac{dy}{y}\right)^2}\right)$$

Where;

CF = correction factor to correct for the low bias during the in-leakage
x = average baseline CO_2 concentration value (11.04 %CO_2)
dx = standard deviation of the baseline CO_2 concentration values (0.04 %CO_2)
y = average CO_2 concentration value during the biased period
dy = standard deviation of the CO_2 concentration value during the biased period

The correction factor was determined to be 1.306 for January 17 through March 3, 2007. This correction factor is slightly higher than the correction factors that Midwest proposed (1.24 and 1.29). EPA could not identify two clearly distinct periods within the time period of January 17 through March 3, 2007 where different stable biases clearly existed and therefore is adopting a single correction factor in this instance. EPA also notes that Midwest's proposed approach for deriving a correction factor did not take into account the uncertainty of the average calculated for the biased data. EPA believes that it is necessary to account for this uncertainty when developing correction factors for probe leak situations to ensure the corrections are conservative. The same correction factors should be used for all three gases, SO_2, NO_x, and CO_2, because air in-leakage at the probe of a dilution-extractive CEMS lowers the concentrations of all components of a stack gas sample by an equal percentage.[2]

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1 Note that the uncertainty of a quotient is equal to the square root of the sum of squared fractional uncertainties for the individual input values times the quotient result. See, e.g., John R. Taylor, An Introduction to Error Analysis at 56-57 (1982).

2 The assumption of equal dilution of the three gases is based on the fact that the concentrations of SO_2, NO_x, and CO_2 in the in-leaked gas are insignificant.

Table 1 – Derivation of Correction Factors by Period

Time Period	Average CO_2	Standard Deviation (uncertainty)	Base Correction Needed	Base Correction Uncertainty	Final Correction Factor
01/17/07 - 03/03/07	11.044	±0.139	1.254	±0.052	1.306

Although the gas monitoring systems installed on Will County, Unit 3 passed all of the required daily and quarterly quality-assurance tests in the period from January 17 through March 3, 2007, data analyses performed by Midwest and EPA have shown that the actual emission measurements made during that time interval were invalid (i.e., biased low). EPA notes that the only Part 75 quality assurance tests that will detect a low bias caused by a probe leak are a RATA and bias test, which are typically performed just once a year

Ordinarily, for any unit operating hour in which valid, quality-assured data are not obtained with a certified monitor, the standard missing data provisions in §§75.30 through 75.33 would be used to determine the appropriate substitute data values to be reported. Substitute data tends to overstate emissions, particularly when the period of missing data is composed of a large number of consecutive hours. It is designed to provide a conservative estimate of the actual emissions and at the same time encourage good maintenance practices that increases data capture.

However, EPA finds that using standard substitute data in this case during the time period identified grossly overstates the unit's emissions. As reflected in Table 2 below, use of standard substitute data in this case would result in reported emissions equaling about 130% of EPA's estimate of Unit 6's likely emissions[3]. Furthermore, the data analyses described above have demonstrated that there was a consistent, uni-directional bias in the data recorded by Unit 3's CEMS in the period extending from January 17 through March 3, 2007. In addition, the correction factor reflecting this uniform bias results in reasonable but conservatively high emissions data. EPA therefore approves Midwest's petition to make an upward adjustment of the SO_2, NO_x, and CO_2 emissions data for most of this time period, in lieu of using the standard Part 75 missing data routines. The approved bias correction factor is 1.306 from January 17 until to March 3, 2007. During this period the concentration data shall be using a special MODC code of "53", which is to mean "other quality assured methodology approved through petition." These hours are to be included in the missing data lookback and are to be treated as available hours for percent monitor availability calculations. Midwest also needs to recalculate all mass, emissions rate, and heat input values using the adjusted pollutant concentrations.

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3 This estimate of the "likely emissions" was obtained by applying the base correction factor in Table 1, which assumes that SO_2, NO_x and CO_2 were all underreported by the same percentage in each time period but does not take into account the uncertainty of the averages used to calculate the factors.

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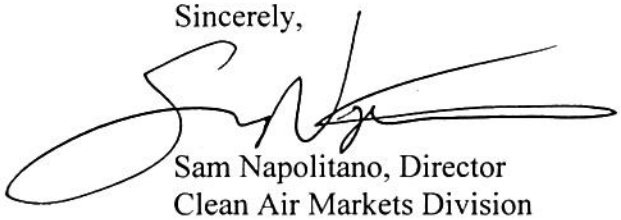
Table 2: Impact of Standard and Alternative Missing Data on Reported SO_2 Emissions During Probe Leak

SO_2 Calculation Method	Total SO_2 Emissions (tons)
Unadjusted data, as originally reported	550
Adjusted data (estimate of likely actual emissions)	690
Standard Part 75 missing data substitution	926
Midwest's Requested correction	688
Adjusted data (using EPA approved correction factor)	**718**

Correcting the data will require a resubmission of the first, second, third, and fourth quarter 2007 EDRs for Unit 3. EPA estimates that the correction will cause SO_2 mass emissions for 2007 to increase by approximately 168 tons over what was originally reported for Unit 3 and be approximately 31 tons over the mass that would have resulted if EPA had granted Midwest's suggested substitute data methodology in its petition. Midwest should coordinate resubmission of the data with Mr. Craig Hillock, who may be reached at (202) 343-9105 or by e-mail at hillock.craig@epa.gov.

EPA's determination relies on the accuracy and completeness of Midwest's June 12, 2008 petition and the associated electronic data reports and is appealable under Part 78. If you have any questions regarding this correspondence, please contact Louis Nichols at (202) 343-9008.

Sincerely,



Sam Napolitano, Director
Clean Air Markets Division

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Kevin Matison, IEPA
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