



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

OCT - 5 2004

OFFICE OF
AIR AND RADIATION

Daniel F. Cole
Designated Representative
AmerenUE
One Ameren Plaza
1901 Chouteau Avenue
P.O. Box 66149
St. Louis, MO 63166-6149

Re: Petition to Use an Alternative Missing Data Substitution Methodology for Unit 1
at the Sioux Power Plant (Facility ID (ORISPL) 2107)

Dear Mr. Cole:

This is in response to your June 16, 2004 letter, in which Ameren UE (Ameren) requested to use an alternative missing data substitution methodology for Unit 1 at the Sioux Power Plant. EPA approves the petition, with conditions, as discussed below.

Background

Ameren owns and operates a coal-fired boiler, Unit 1, at its Sioux Power Plant in West Alton, Missouri. Unit 1 is subject to the Acid Rain Program, which requires Ameren to continuously monitor and report sulfur dioxide (SO₂), nitrogen oxides (NO_x) and carbon dioxide (CO₂) emissions and unit heat input, in accordance with 40 CFR Part 75. To meet these monitoring requirements, Ameren has installed and certified dilution extractive continuous emission monitoring systems (CEMS) and a flow monitor.

Early in 2004, a boiler engineer at the Sioux facility noticed that the CO₂ readings were lower than normal. Ameren initially believed that a process problem (e.g., a damaged expansion joint or faulty seals at the air preheater) was causing the low readings, since air in-leakage into the ductwork can dilute the stack gas and reduce the gas concentrations. Upon investigation, several ductwork leaks and two damaged expansion joints were found, and repairs were made. Although these repairs produced a noticeable improvement in the CO₂ readings, the CO₂ levels remained below normal.

When the ductwork repairs failed to bring the CO₂ concentrations back to normal, Ameren performed a series of extensive checks of the CO₂ monitor. However, the monitor appeared to be working properly and was able to pass its daily calibration error and linearity tests. Therefore, as a last resort, Ameren hired a contractor to measure SO₂, CO₂, and NO_x emissions from Unit 1, using EPA reference methods. The results of these emission tests indicated that the CO₂ monitor was reading 15% lower than the reference method and that the SO₂ and NO_x monitors were also reading 12% and 13% below their respective reference methods. This consistent low bias in the measurements from all three gas monitors led Ameren to suspect that there was a problem with the stack gas sampling and dilution system.

Upon investigation, Ameren discovered that there were small cracks in the fittings of the rotometer that controls the flow of calibration gas to the dilution probe. During normal stack gas sampling, this calibration gas line must be air-tight, otherwise ambient air will be drawn into the sampling system, diluting the gas sample. This air in-leakage is not detectable when calibrations and linearity checks are performed, because the probe is flooded with excess calibration gas during these tests.

Believing the cracked rotometer fittings to be the cause of the low gas monitor readings, Ameren removed the damaged rotometer from the system and replaced it with a new one. After replacing the rotometer, Ameren performed calibration error tests, linearity checks, and relative accuracy test audits (RATAs) on the gas monitors. All of these tests were successful, indicating that the low bias in the monitor readings had been eliminated and the monitors were once again measuring the emissions accurately.

Once the leak in the dilution system was repaired, Ameren reviewed the historical CO₂ data and concluded that the problem with the rotometer first appeared on January 27, 2004 when the CO₂ readings began to be consistently low, and ended on May 4, 2004, hour 14, after the rotometer was replaced. In view of the emission test results, Ameren believes that the emissions data from all three gas monitors (SO₂, NO_x, and CO₂) were under-reported during this time period and should be invalidated. Ordinarily, for any unit operating hour(s) in which valid, quality-assured data are not obtained with a certified monitor, application of the missing data provisions in §§75.30 through 75.33 would be required.

According to Ameren, application of the standard Part 75 SO₂ missing data routines to the time period in question results in 15,736 tons of reportable SO₂ emissions in the interval from January 1, 2004 to May 4, 2004, as opposed to 6,679 tons using the data recorded by the SO₂ monitor. The large discrepancy (more than 9,000 tons) in these two SO₂ emission totals is attributable to the length of the missing data period, which caused the percent monitor data availability (PMA) of the SO₂ monitor to drop to low levels. The lower the PMA, the more conservative the missing data algorithm that must be used.

Because the period of invalid data spanned across two calendar quarters, it is treated as two separate missing data periods, i.e., one from January 27 through March 31, 2004, and one

from April 1 to May 4, 2004. Two different missing data algorithms apply to these missing data periods. From January 27 through March 31, 2004, the maximum SO₂ concentration recorded in the previous 720 hours (i.e., 1122 ppm) must be reported, since the PMA at the end of the first quarter was between 80.0% and 89.9%. From April 1 to May 4, the maximum potential concentration (i.e., 1440 ppm) must be reported, since the PMA on May 4 had dropped below 80.0%.

According to Ameren, using these substitute data values overestimates the SO₂ mass emissions from Unit 1 by more than a factor of two, and could cost the company more than \$3 million in lost allowances. For instance, the average SO₂ concentration recorded by the CEMS in the period from January 27 through March 31, 2004 was 508 ppm, which is less than half of the substitute data value of 1122 ppm.

Ameren believes that the results of the previously-mentioned reference method tests, which showed the SO₂ concentrations to be biased 12% low, provide a basis for determining more reasonable substitute data values. Therefore, in the June 16, 2004 petition, Ameren proposed to apply an adjustment factor of 1.17 to the hourly SO₂ concentrations recorded by the CEMS in the time period extending from January 27 to May 4, 2004. The factor of 1.17 accounts for the 12% low bias and includes an additional 5% upward adjustment to alleviate concerns that emissions might be under-reported. Ameren also proposed a similarly conservative adjustment factor of 1.18 for NO_x emission rate (lb/mmBtu) and an adjustment factor of 1.15 for CO₂ concentration.

EPA's Determination

EPA conditionally approves Ameren's request to use an alternative substitute data methodology for Sioux Unit 1 in the time period extending from January 27, 2004, hour 07 to May 4, 2004. The petition is approved for the following reasons:

- Ameren self-reported the problem with the gas monitors, which, in view of the fact that the SO₂, NO_x, and CO₂ monitors passed their daily calibrations and quarterly linearity checks, may otherwise have gone undetected by EPA;
- Ameren took reasonable and appropriate actions to correct the problem in a timely manner;
- The nature of the problem (cracked rotometer fittings) is such that one would expect the ambient air in-leakage to be relatively constant throughout the time period in question, producing a consistent, uni-directional bias in the readings from all three of the gas monitors;
- The results of the reference method tests have adequately quantified the magnitude of the bias, and the adjustment factors proposed by Ameren are

consistent with the test results;

- Application of the standard missing data substitution methodology overstates the SO₂ emissions by a factor greater than 2.0; and
- An extra 5% upward adjustment of the SO₂, NO_x, and CO₂ data ensures that the reported emissions will not be underestimated, and is consistent with EPA's general approach of using conservative substitute data to create an incentive to keep CEMS operational and well-maintained.

The conditions of this approval are as follows:

- (1) For the purposes of the electronic data reports (EDRs) required under §75.64, Ameren shall report the following adjusted hourly SO₂ concentrations, CO₂ concentrations, and NO_x emission rates, for each of the hours in the period of invalid data extending from January 27, 2004, hour 07 to May 4, 2004, hour 14:
 - (a) Ameren shall apply an adjustment factor of 1.17 to each SO₂ concentration measured by the CEMS and shall report the adjusted concentrations in column 35 of EDR record type 200. Column 29 of record type 200 shall be left blank; and
 - (b) Ameren shall apply an adjustment factor of 1.18 to each NO_x emission rate measured by the CEMS and shall report the adjusted concentrations in column 42 of EDR record type 320. Column 36 of record type 320 shall be left blank; and
 - (c) Ameren shall apply an adjustment factor of 1.20 to each CO₂ concentration measured by the CEMS and shall report the adjusted concentrations in column 24 of EDR record type 202. This CO₂ adjustment factor is approximately 5% higher than the value of 1.15 proposed by Ameren, to make it consistent with the SO₂ and NO_x adjustment factors.
- (2) The adjusted SO₂ concentrations, NO_x emission rates, and CO₂ concentrations shall be reported using a method of determination code (MODC) of "55" (i.e., "Other substitute data approved through petition by EPA"). Manual entry of the adjusted concentrations, adjusted emission rates, and the MODC codes is permitted.
- (3) If, for any hour in the period extending from January 27, 2004, hour 07 to May 4, 2004, hour 14, measured SO₂ concentration, CO₂ concentration, or NO_x emission rate data are unavailable and substitute data values (derived from the standard missing data routines) appear in column 35 of RT 200, or in column 42 of RT

320, or in column 24 of RT 202, Ameren shall apply the appropriate adjustment factors from (1), above, to the substitute data values that appear in these columns, and shall change the MODCs to "55".

- (4) Ameren shall not report hourly NO_x or diluent gas concentrations in EDR record types 201 and 210 for any of the hours of the period of invalid data. However, Ameren shall keep records of these concentrations on-site and shall make them available to inspectors and auditors upon request.
- (5) Since the adjustments to the 1st quarter, 2004 data described in (1) through (3), above, affect the cumulative emissions and heat input for the year, Ameren must resubmit the 1st and 2nd quarter, 2004 EDR reports for Sioux Unit 1.

EPA's determination in this letter relies on the accuracy and completeness of the information provided by Ameren in the June 16, 2004 petition 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: Jon Knodel, EPA Region VII
Peter Yronwode, Missouri Department of Natural Resources
Robert Vollaro, CAMD