



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

MAR 15 2004

OFFICE OF
AIR AND RADIATION

John W. Moffett
Alternate Designated Representative
Kentucky Utilities Company
One Quality Street
Lexington, KY 40507

Re: Petition for Alternative Method of Missing Data Substitution
Following Failure of Quarterly Linearity Test for Units 2 and 3 at
Kentucky Utilities Company's E.W. Brown Generating Station
(Facility ID (ORISPL) 1355)

Dear Mr. Moffett:

EPA has reviewed your November 10, 2003 petition under §75.66 in which Kentucky Utilities Company (KU) requested to use an alternative method of missing data substitution following a failed linearity check, for Units 2 and 3 at the E.W. Brown Generating Station. As discussed below, EPA approves the petition, with conditions.

Background

KU owns and operates two coal-fired boilers, Units 2 and 3, at the E. W. Brown facility in Burgin, Kentucky. The units discharge to the atmosphere through a common stack which has an ID number of CS003. Units 2 and 3 are subject to the Acid Rain Program and KU is required to continuously monitor and report sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon dioxide (CO₂) emissions and heat input for the units, in accordance with 40 CFR Part 75. The units are also subject to the NO_x Budget Trading Program, and are required to monitor and report NO_x mass emissions and heat input, under Title 401 of the Kentucky Administrative Regulations (KAR) Chapter 51, Section 160 (401 KAR 51:160).

To satisfy the NO_x monitoring requirements of the Acid Rain and NO_x Budget Programs, KU has installed and certified a NO_x-diluent continuous emission monitoring system (CEMS) at common stack CS003, consisting of a NO_x pollutant concentration monitor and a CO₂ monitor. For each hour of unit operation, this monitoring system measures and records the NO_x concentration (in ppm) and the CO₂ concentration (in percent CO₂), from which the NO_x emission rate (in lb/mmBtu) is determined.



Recycled/Recyclable
Printed with Soy/Canola Ink on paper that
contains at least 50% recycled fiber

KU is required to calibrate and maintain the NO_x-diluent monitoring system according to the quality assurance and quality control procedures in Appendix B of Part 75. Section 2.2.1 of Appendix B requires KU to perform quarterly linearity checks of the NO_x and CO₂ monitors, at three different calibration gas levels (i.e., low, mid, and high). According to section 3.2 of Appendix A to Part 75, the allowable linearity error at each gas level is 5.0 % of the reference gas concentration, or "tag value". Alternatively, for the CO₂ monitor, the test results are acceptable if, at each gas level, the absolute difference between the mean monitor response and the reference gas tag value does not exceed 0.5 % CO₂.

On July 24, 2003, E.W. Brown personnel performed the required quarterly linearity checks of the NO_x and CO₂ monitors, as specified in Appendix B of Part 75. Once the tests were completed, supervisory personnel reviewed the CO₂ linearity test data and interpreted the linearity errors for the low, mid and high gas levels to be 3.9 %, 0.6 %, and 4.1 %, respectively. Because these results appeared to have met the 5.0 % linearity error specification, the supervisor approved the test results, believing the test to have been passed. However, the linearity test report produced by the data acquisition and handling system (DAHS) did not clearly indicate that the CO₂ linearity test had actually been failed at the mid gas level.

The test report seemed to indicate a mid-level linearity error of 0.6 %, when in fact the actual percent error was 5.4 %. The confusion stems from the fact that when the linearity check of a CO₂ monitor fails to meet the 5.0 % linearity error specification, the DAHS software automatically recalculates the test results in terms of the alternative specification, i.e., as the absolute difference between the mean CEMS and reference values. Therefore, the value of 0.6 % displayed in the test report was actually 0.6 % CO₂ (absolute mean difference), rather than 0.6 percent of the reference gas tag value. Since a mean difference of 0.6 % CO₂ exceeds the alternative performance specification of 0.5 % CO₂, the linearity check was failed at the mid gas level.

Whenever the linearity check of a Part 75 monitor is failed, the monitor is considered to be out-of-control, and all data from the monitor are considered invalid, until a subsequent linearity check is passed. In this case, the CO₂ test failure results in 1,754 hours of CO₂ data being invalidated. Since the CO₂ monitor is a component of the NO_x-diluent monitoring system, the NO_x system is also considered to be out-of-control for 1,754 hours. Thus, KU is required to use the Part 75 missing data algorithms to provide substitute CO₂ concentration and NO_x emission rate data for these hours. Invalidation of 1,754 hours of data will result in the percent monitor data availability (PMA) for NO_x emission rate and CO₂ concentration dropping below 80.0 %, which, according to the standard missing data procedures in §75.33, requires the maximum potential NO_x emission rate (MER) to be substituted for each hour of the missing data period.

In the November 10, 2003 petition KU requested relief from using the Part 75 standard missing data procedures for the out-of-control period following the failed CO₂ linearity check, noting that the test was failed at only one of the three gas levels (and exceeded the performance

specification by only 0.1 % CO₂), and that the monitor passed all of its daily calibration checks during the time period in question. KU further justified its request for relief by citing the E.W. Brown facility's history of exemplary compliance with Part 75.

KU proposed the following alternate method of data substitution for the 1,754 hours of invalid CO₂ and NO_x emission rate data. An adjustment factor of 0.949 would be applied to each of the 1,754 hours of invalid CO₂ data. This adjustment factor is based on the July 24, 2003 linearity test results, where the measured mid-level CO₂ concentration was 11.8 % CO₂ and the reference gas concentration was 11.2 % CO₂ (and the ratio of 11.2 to 11.8 is 0.949). The adjusted hourly CO₂ values would be used in conjunction with the measured hourly NO_x concentrations to calculate the hourly NO_x emission rates. Use of an adjustment factor of 0.949 would lower each measured CO₂ hourly concentration by approximately 5 % . Since KU uses Equation F-6 from Appendix F of Part 75 to calculate NO_x emission rate, and CO₂ is in the denominator of the equation, lowering the CO₂ by 5 % would increase the reported NO_x emission rates by 5 %.

In addition to the above proposal, KU requested permission to reset the monitor data availability "clock" on the CO₂ analyzer. KU believes that the adjusted data from the CO₂ analyzer for the 1,754 hours in question should be considered valid, and the percent monitor data availability associated with this analyzer should not be reduced by the failed linearity check.

EPA notes that KU has undertaken many internal QA/QC measures since the failed linearity check to ensure that similar problems do not occur in the future. These measures include changes to the DAHS software to more clearly indicate failed linearity checks, training of operation personnel, and more detailed and frequent checks of hourly data.

EPA's Determination

EPA conditionally approves KU's request to use an alternative data substitution methodology for CO₂ and NO_x emission rate for E.W. Brown Units 2 and 3, for the 1,754 operating hours following the failed linearity check of the CO₂ monitor on July 24, 2003. This approval is based principally on the fact that the NO_x concentration monitor passed all of its required daily and quarterly quality-assurance tests for the time period in question. The conditions of approval are as follows:

- (1) For the 1,754 hours in question, KU shall use a constant default value of 10.6 % CO₂ in conjunction with the actual, measured hourly NO_x concentrations (in ppm) to calculate the hourly NO_x emission rates (in lb/mmBtu). A default value of 10.6 % CO₂ shall be used in the NO_x emission rate calculations instead of using the CO₂ data adjustment procedure proposed by KU, because the proposed procedure is not consistent with the substitute data provisions of Part 75. Although the CO₂ monitor failed its linearity at only one level, and only by a small amount, the test was still failed, and the CO₂ monitor is considered to be out-of-control. As

previously noted, all data from an out-of-control monitor are considered invalid and missing data substitution, rather than data adjustment, is appropriate. The 10.6 % CO₂ substitute data value is the 10th percentile value obtained from a lookback through the 720 hours of quality-assured CO₂ data recorded immediately prior to the out-of-control period. A conservatively low (10th percentile) CO₂ value has been selected to ensure that the NO_x emission rates are not underestimated (as previously noted, as the percent CO₂ decreases, the NO_x emission rate increases).

- (2) For the purposes of the electronic data reports (EDRs) required under §75.64, KU shall report an hourly NO_x emission rate, calculated according to (1), above, for each of the 1,754 hours of the missing data period. The NO_x emission rates shall be reported in EDR record type 320, using a method of determination code (MODC) of "55" (i.e., "Other substitute data approved through petition by EPA"). Manual entry of the NO_x emission rates and MODC codes is permitted.
- (3) KU shall not report hourly NO_x or diluent gas concentrations in EDR record types 201 and 210 for any of the 1,754 hours of the missing data period. Instead, KU shall submit a separate electronic file to the Clean Air Markets Division, showing the hourly NO_x concentrations used to calculate the NO_x emission rates during the missing data period. The electronic file shall be sent to Manuel Oliva, at : oliva.manuel@epa.gov.
- (4) For the CO₂ monitoring system and for heat input determination, KU shall use the standard missing data procedures in §75.35(d) to provide substitute CO₂ data for the 1,754 hours of the missing data period. The substitute data values shall be reported in EDR record type 202.
- (5) KU shall not reset the percent monitor data availability for either the CO₂ monitoring system or for the NO_x emission rate monitoring system, for the 1,754 hours in question. However, if the PMA of the NO_x emission rate monitoring system has dropped below 80.0 % as a result of the 1,754 hour missing data period, KU may use a variant of the alternative procedure described in (1), above, to provide substitute NO_x emission rate data, for any hour in which a valid NO_x concentration is obtained¹, until the PMA returns to 80.0 %. After that, KU shall resume using standard missing data procedures in §75.33 for NO_x emission rate.

¹ That is, until the PMA returns to 80.0 %, for any hour in which a valid NO_x concentration value is obtained but the CO₂ monitor is out-of-control, KU may, in lieu of reporting the MER, calculate the NO_x emission rate using the measured NO_x concentration and a CO₂ value of 10.6 % CO₂, reporting a MODC of "55" in RT 320. However, for missing data hours where the NO_x monitor is out-of-control, KU shall report the NO_x MER in RT 320, using a MODC of "12".

EPA's determination relies on the accuracy and completeness of the information provided by Kentucky Utilities Company in the November 10, 2003 petition and is appealable under Part 78. If you have any questions or concerns about this determination, please contact Manuel J. Oliva, at (202) 343-9009.

Sincerely,

A handwritten signature in black ink, appearing to read "S. Napolitano", with a long horizontal flourish extending to the right.

Sam Napolitano, Acting Director
Clean Air Markets Division

cc: Wilson Haynes, EPA Region IV
Jerry Slucher, Kentucky DEP
Manuel J. Oliva, EPA CAMD