May 31, 2006

Mr. Donald L. Hetherington
Authorized Account Representative
Braintree Electric Light Department
150 Potter Road
Braintree, MA 02184

Re: Approval of the Predictive Emission Monitoring System Installed on Unit 3 at Braintree Electric Light Department's Norton P. Potter II Station (ORISPL 01660)

Dear Mr. Hetherington:

This letter approves the April 25, 2005 petition submitted by Braintree Electric Light Department (BELD) under '75.66(d) and 40 CFR Part 75, Subpart E. In that petition, BELD requested approval of a predictive emission monitoring system (PEMS) to continuously monitor nitrogen oxides (NO_x) emissions from the Unit 3 combined-cycle unit at BELD=s Norton P. Potter II Station in Braintree, MA.

On July 13, 2005, in accordance with '75.20(f), EPA published a notice in the Federal Register concerning BELD=s request for approval of an alternative monitoring system (see 70 FR 40330, July 13, 2005). The 60-day public comment period closed on September 12, 2005. No comments were received.

Background

On April 25, 2005, BELD petitioned for approval of a NO_x PEMS that is installed on Unit 3 at the Potter II Station. The PEMS is a computer software system that utilizes turbine sensor inputs to produce NO_x outputs. This petition documented the methods used to establish the relationships and demonstrates the precision of the parametric measurements. The PEMS approach to monitoring emissions is based upon the establishment of relationships between NO_x emissions and turbine operating parameters, as determined from turbine sensors and billing fuel meters. The PEMS monitors numerous parameters, including fuel flow and fuel properties, combustion air properties, steam injection flow and steam properties, and exhaust properties. The operating parameters are converted to the NO_x emission rate using relationships developed for each fuel type.

BELD owns and operates the Potter II Station located on Potter Road in Braintree, Massachusetts. Unit 3 is a combined-cycle unit, which consists of a 76-megawatt Asea Brown Boveri (ABB) Model 11D2 gas combustion turbine that exhausts into a Combustion Engineering heat recovery steam generator (HRSG). The combustion turbine is capable of firing either natural gas or No. 2 fuel oil with a maximum base load heat input of 902 mmBtu/hr (975 mmBtu/hr peak). The turbine is equipped with a steam injection system for NO_x reduction. The HRSG produces steam for a 20.5-megawatt Worthington steam turbine, steam injection for NO_x emissions control, and de-aeration. The HRSG operates strictly on waste heat from the exhaust of the gas turbine; there

are no duct burners or other sources of supplementary firing. Natural gas serves as the primary fuel for the facility. The gas turbine has a set air intake flow, which is solely dependent upon ambient conditions, and uses fuels with fairly constant heat content.

Unit 3 is subject to the NO_x Allowance Trading Program under Massachusetts Department of Environmental Protection (MassDEP) regulations 310 CMR 7.28, which requires BELD to report NO_x mass emissions for this unit in accordance with Subpart H of 40 CFR Part 75. To meet the NO_x emissions monitoring requirements, BELD proposed to continue using its PEMS.

The monitoring provisions of 310 CMR 7.28 required certification of NO_x monitoring by May 1, 2002. 310 CMR 7.28 requires BELD to follow the procedures stipulated in 40 CFR Part 75, Subpart E, Alternative Monitoring Systems, to demonstrate that the PEMS provides equivalent mass emission measurement precision and data reliability to a continuous emissions monitoring system (CEMS). From May 1, 2002 to the present, BELD monitored NO_x emissions in accordance with the *Alternative Monitoring System Test Protocol* submitted to both USEPA and MassDEP in 2002 (Earth Tech, 2002) and approved by USEPA on May 22, 2002.

EPA=s Determination

Under Subpart E, the owner or operator of a unit applying to the Administrator for approval of an alternative monitoring system (AMS) must demonstrate that the AMS has the same or better precision, reliability, accessibility, and timeliness (PRAT) as provided by a CEMS. The demonstration must be made by comparing the AMS to a contemporaneously operating, fully certified CEMS or a contemporaneously operating reference method. BELD opted to install a temporary reference method system [Reference Method 7E (RM7E)] to obtain the hourly reference data. Sections 75.41 through 75.46 discuss the criteria for evaluating PRAT, daily quality assurance, and missing data substitution for the AMS. Section 75.48 details the information that must be included in the application in order to demonstrate that the criteria in '' 75.41 – 46 are met.

The following paragraphs describe how BELD meets the requirements of a Subpart E AMS petition. As detailed below, EPA=s approval applies to the Potter Unit 3 combustion turbine when firing natural gas (primary fuel) or fuel oil, and for the PEMS output of NO_x emissions in units of lb NO_x/mmBtu. If a PEMS input parameter value goes below certain minimum or above certain maximum values, BELD shall report the maximum potential NO_x emission rate (MER). During any hour or partial hour of startup (defined as the period from light off to minimum load and until the time steam injection is established), shutdown (defined as the time from loss of steam injection until flame out occurs), loss of steam injection, or if the PEMS alarms, BELD must report the NO_x MER.

1. Precision

Under '75.41, for the normal unit operating level, the owner or operator must provide paired AMS and reference method hourly data for at least 90 percent of the hours during 720 unit operating hours for the primary fuel supply and for at least 24 successive[1] unit operating hours for all alternative fuel supplies that have significantly different sulfur content. Missing data procedures must not be used to provide sample data. The data may be adjusted to account for any lognormality and time dependency autocorrelation. Three statistical tests must be passed, i.e., a linear correlation coefficient (r) $\geq$ 0.8, an F-test, and a one-tailed t-test for bias described in Appendix A to Part 75. Further, the owner or operator must provide two separate time series plots for AMS and CEMS data. Each data plot must have a horizontal axis representing the clock hour and calendar date of the readings and must contain a separate data point for every hour for the duration of the test. One data plot must show percentage difference vs. time, and the other data plot must show AMS and CEMS readings vs. time. Finally, a plot of the paired AMS (on the vertical axis) and CEMS (on the horizontal axis) concentrations must be provided.

BELD collected a total of 1,095 unit operating hours of paired PEMS and RM7E data from May 2, 2002 through December 9, 2004. Of the 1,095 hours, 676 hours were collected during combustion of natural gas (primary operating configuration) and 419 hours were collected during the combustion of fuel oil (alternative operating configuration). The number of paired hourly data provided for the normal operating level and primary fuel meets the Subpart E '75.41(a)(6) requirement of using at least 90.0% of the hours during 720 unit operating hours (i.e., 648 hours). As well, the 419 hours of oil data meets the requirement of providing at least 24 hours for the alternative fuel supply.

Under '75.41(b), in preparation for conducting the required statistical tests, the data were screened for lognormality and time dependency autocorrelation. If either is detected, certain calculation adjustments are required. BELD determined that none of the data sets met the test of lognormality. However, autocorrelation was determined to be present in the data sets, consequently, the variance of the data were adjusted.

The table below shows the results of the statistical tests for the PEMS output during combustion of each fuel supply.

PEMS (lbs NO_x/mmBtu) - Natural Gas	PEMS (lbs NO_x/mmBtu) - Fuel Oil
t-test: mean difference, d = 0.000136 abs. value of confidence coefficient, cc = 0.00313 **Evaluation:** Since |cc| $\geq$ d, the model passed.	**t-test:** mean difference, d = -0.0000627 abs. value of confidence coefficient, cc = 0.00493 **Evaluation:** Since |cc| $\geq$ d, the model passed.
r-coefficient correlation: r = 0.8524 **Evaluation:** Since r $\geq$ 0.8, the model passed.	**r-coefficient correlation:** r = 0.9211 **Evaluation:** Since r $\geq$ 0.8, the model passed.
F-test: variance of PEMS = 0.000963	**F-test:** variance of PEMS = 0.00289

1 Note that page 6 of USEPA's May 22, 2002 conditional approval allowed "non-consecutive hours of firing the secondary fuel (oil)."

variance of RM = 0.00125 F = 0.771 $F_{critical}$ = 1.135 **Evaluation:** Since $F_{critical} \geq F$, the model passed.	variance of RM = 0.00346 F = 0.836 $F_{critical}$ = 1.175 **Evaluation:** Since $F_{critical} \geq F$, the model passed.

The PEMS NO_x lb/mmBtu output passed each of the three statistical tests for both fuels. Further, BELD supplied the appropriate data plots concerning the paired PEMS and RM7E data under ''75.41(a)(9) and (c)(2)(i).

2. Reliability

According to '75.42, the owner or operator must demonstrate that the PEMS is capable of providing valid 1-hr averages for 95.0 percent or more of unit operating hours over a 1-year period and that the system meets the applicable requirements of Appendix B of Part 75. BELD complied with the reliability requirement by providing data collected by the data acquisition and handling system (DAHS) from January 1, 2002 through November 30, 2004. The PEMS data base was evaluated to determine the percentage of operating hours that each parametric monitor was itself operating. The results demonstrated greater than 95.0 percent PEMS availability.

BELD also proposed to ensure the accuracy of the NO_x emission rate calculated by the PEMS by analyzing all sensor inputs to determine if the sensor values are of good quality and within predetermined acceptable ranges. The use of redundant sensors and hourly manual recording of PEMS gauges will validate the process data provided to the PEMS. Also, in the event of a failed sensor, the PEMS will include the automatic and manual reconciliation of the process data. The benefit of Sensor Validation is the PEMS emission determination will not drift significantly from the original PEMS value.

By meeting the quality assurance/quality control (QA/QC) requirements described in this letter, BELD will also meet the applicable Appendix B QA/QC requirements.

3. Accessibility and Timeliness

According to ''75.43 and 75.44, the owner or operator must demonstrate that the PEMS meets the recordkeeping and reporting requirements of Subparts F and G of Part 75. BELD states that the PEMS meets these requirements. The DAHS records all measured and calculated parameters required to calculate the NO_x emission rate on an hourly basis and is equipped to issue a record of data for the previous day within 24 hours. The DAHS also maintains immediately accessible records for at least three years. To meet the reporting requirements of Subpart G, BELD shall follow the EDR version 2.2 reporting instructions in conjunction with the required PEMS record types, and the supplementary EDR reporting instructions attached to this petition response, to report data from the PEMS (see Attachments A and B).

4. Quality Assurance

Under '75.45, the owner or operator must demonstrate either that daily tests equivalent to those in Appendix B of Part 75 can be performed on the PEMS or that such tests are unnecessary for providing quality-assured data. Sections 75.48(a)(8) – (11) require the following information to be submitted: a detailed description of the process used to collect data, including

location and method of ensuring an accurate assessment of operating hourly conditions on a real-time basis; a detailed description of the operation, maintenance, and quality assurance procedures for the AMS as required in Part 75, Appendix B; a description of methods used to calculate diluent gas concentration; and results of tests and measurements necessary to substantiate the equivalency of the AMS to a fully certified CEMS or reference method.

EPA finds that the Potter II Station Unit 3 PEMS will satisfy these requirements if the following QA procedures are implemented:

(a) The PEMS shall use the following input parameters: turbine output, natural gas flow to combustor, fuel oil flow to the combustor, ambient temperature, ambient atmospheric pressure, ambient relative humidity, inlet filter pressure drop, steam injection flow rate, and steam injection temperature. The PEMS input parameters must stay within the minimum and maximum values (inclusive) in the below table (referred to as "the PEMS operating envelope"), unless the PEMS is retrained according to paragraph (g) below, in which case, the new training values will supersede the values in the below table. If any PEMS input parameter value goes below the minimum or above the maximum table values by 5 percent or more, the PEMS shall be considered out-of-control, and the NO_x MER shall be used, calculated according to paragraph (h), starting with the hour in which the sensor value goes outside of the PEMS operating envelope and ending with the hour in which the sensor value is back within the PEMS operating envelope. Data from each PEMS input parameter shall be maintained on site in a form suitable for inspection for at least three (3) years from the date of each record.

PEMS Operating Envelope

PEMS Input Parameter	Minimum Value	Maximum Value
turbine output without HRSG (MW)	37.4	79.5
natural gas flow to combustor (hscf/min)	5383.6	9015.6
fuel oil flow to the combustor (gal/hr)	4730.1	6712.1
ambient temperature (°F)	-4.0	99.4
ambient atmospheric pressure (in. Hg)	29.38	31.21
ambient relative humidity (percent)	26.57	100
inlet filter pressure drop (in. H_2O)	1.5	3.15
steam injection flow rate (lb/hr)	31,042.9	67,113.3
steam injection temperature (°F)	358.39	463.53

(b) Ongoing QA/QC tests of the PEMS shall be performed according to the following table:

PEMS Ongoing QA/QC Tests

Test	Performance Specification	Frequency
Daily QA/QC	PEMS output - PEMS output is within ± 0.002 lb NO_x/mmBtu [see paragraph (e)]	Daily

PEMS Ongoing QA/QC Tests

Test	Performance Specification	Frequency
3-run RAA	• Accuracy ≤ 10.0% or • For a low emitting source,[1] results are acceptable if the mean value for the PEMS is within ± 0.020 lb/mmBtu of the reference mean value	Monthly during ozone season.
RATA	For semiannual RATA frequency: • RA > 7.5% and ≤ 10.0% or • For a low emitting source,[1] results are acceptable if the mean value for the PEMS is within ± 0.020 lb/mmBtu of the reference method mean value. For annual RATA frequency: • RA ≤ 7.5% or • For a low emitting source,[1] results are acceptable if the mean value for the PEMS is within ± 0.015 lb/mmBtu of the reference method mean value	Semiannual or annual (depending on the RATA results) for routine QA. Recertification RATA is required when a RAA or a RATA is failed or when operating conditions change. ≥ 9 test runs are required at normal operating level for annual or semiannual QA. ≥ 30 test runs are required at each of 3 operating levels for recertification. [see paragraphs (f) and (g)].
Sensor validation system (minimum data capture)	Check for production of at least 1 valid data point per 15 minutes [see paragraph (c)]	Before each RATA [see paragraphs (f) and (g)].
Sensor validation system (failed sensor alert)	Alert operator of any failed sensors [see paragraphs (c) and (d)]	Hourly
Bias adjustment factor	If $d_{avg} \leq \|cc\|$, bias test is passed	After each RATA. Perform bias test at the normal operating level [see paragraphs (f) and (g)].
PEMS training (Linear correlation and F-test)	$r \geq 0.8$, and $F_{critical} \geq F$	According to paragraph (g)
Sensor validation system (alarm system set-up)	[see paragraphs (c) and (d)]	After each PEMS training [see paragraph (g)]

[1] The unit is a low-emitting source if the mean reference value during the RATA or RAA is ≤ 0.200 lb/mmBtu NO_x.

The sensor alarm system validation procedure is described in paragraphs (c) and (d). The daily QA/QC test is described in paragraph (e). The RATAs, 3-run RAAs, and bias adjustment factor are discussed in paragraphs (f) and (g). Recertification, including training, of the PEMS is discussed in paragraph (g).

(c) The sensors for the PEMS= input parameters must be maintained in accordance with the manufacturer=s recommendations. A sensor validation system is required to identify sensor failures hourly to the operator and to reconcile failed sensors

by: comparing each sensor to several other sensors, determining, based on the comparison, if a sensor has failed, and calculating a reasonable substitute value for the parameter measured by the failed sensor. BELD must ensure that the sensor validation system validates sensor data in this way every minute of PEMS operation. To comply with '75.10(d)(1), hourly averages must be computed using at least one valid data point in each fifteen-minute quadrant of an hour in which the unit operates. All valid data recorded by the PEMS during the hour must be used to calculate the hourly averages.

(d) The sensor validation system shall include an alarm to inform the operator when sensors need repair and to indicate that the PEMS is out-of-control. In setting up the alarm system, a demonstration shall be performed at a minimum of four different PEMS training conditions, which must be representative of the entire range of expected turbine operations. For each of the four or more training conditions, the demonstration shall consist of the following:

(1) For all of the sensors used in the PEMS model, input a set of reference sensor values that were recorded either during the training of the PEMS or during a RATA of the PEMS (these values will all be within the PEMS operating envelope). Verify that these reference inputs produce the expected PEMS output, i.e., the expected NO_x emission rate;

(2) Perform one-sensor failure analysis, as follows. Artificially fail one of the sensors and then, using the calculated replacement value for that sensor [see paragraph (c), above], assess the effect on the accuracy of the PEMS. Calculate the percent difference between the reference NO_x emission rate from step (1) and the PEMS output. Repeat this procedure for each sensor, individually;

(3) Identify the sensor failure in step (2) that results in the worst accuracy. If the highest percent deviation exceeds $\pm$ 10.0 percent, then set up the PEMS to alarm when any single sensor fails. If none of the percent difference values exceeds 10.0 percent, proceed to step (4);

(4) Perform two-sensor failure analysis, as follows. Artificially fail the sensor from step (3) that produced the worst accuracy and also fail one of the other sensors. Then, using the calculated replacement values for both sensors, assess the accuracy of the PEMS hourly average output, as in step (2). Repeat this procedure, evaluating each sensor in turn with the sensor from step (3);

(5) Identify the combination of dual sensor failures that results in the worst accuracy. If the highest percent deviation exceeds $\pm$ 10.0 percent, then set up the PEMS to alarm when any two sensors fail. If none of the percent difference values exceeds 10.0 percent, then set up the PEMS to alarm with three sensor failures.

The results of this demonstration shall be maintained on site in a form suitable for inspection. For every hour of PEMS operation, the PEMS shall check for failed sensors and provide an alarm to alert the operator of any sensors needing repair. When the PEMS alarms, the PEMS is out-of-control, and BELD shall report the NO_x MER, calculated according to paragraph (h), starting with the hour after the sensor validation alarm system alarms and ending with the hour after the sensor value is back within the expected range.

(e) A daily QA/QC test must be performed whenever the unit operates for any portion of the day. BELD shall input to the PEMS a set of turbine operating parameters used by the PEMS during a passed PEMS RATA or the most recent PEMS training. (**Note:** It is important that the same number of decimal places for the PEMS inputs be used here as was used in the passed PEMS RATA or most recent PEMS training.) The resulting PEMS NO_x lb/mmBtu output divided by the BAF (this resets the BAF to 1.000 as it was during the passed PEMS RATA or most recent PEMS training) shall be compared to the corresponding PEMS NO_x lb/mmBtu output produced at the time of the passed PEMS RATA or most recent PEMS training (with no BAF applied). If the difference between the two PEMS NO_x outputs is within ∀ 0.002 lb NO_x/mmBtu, the daily QA/QC test is passed. If a daily QA/QC test is failed or not performed, the PEMS is out-of-control. Subpart D missing data procedures shall be followed starting with the hour of the failed test or, if the test was not performed, the hour after the test due date, and ending with the hour in which a daily QA/QC test is passed. No grace periods are allowed. The results of this check (pass/fail) shall be reported in RT 624 in EDR version 2.2. [**Note:** Use code "04" in start column 53 (QA test code) for the daily QA/QC check.]

(f) Ongoing semiannual or annual RATAs shall be performed at the normal operating level according to the procedures in Part 75, Appendix B, section 2.3.1 and shall be calculated on a lb/mmBtu basis. The reference method traverse point selection shall be consistent with Part 75, Appendix A, section 6.5.6. Notification of ongoing RATAs shall be provided according to '75.61(a)(5). Immediately prior to a RATA, the BAF shall be set to 1.000. Before each RATA, BELD shall ensure that the sensor validation system is set to provide at least one valid data point per 15 minute period, as discussed in paragraph (c). After the RATA, BELD shall calculate and apply a bias adjustment factor at the normal operating level according to Part 75, Appendix A, section 7.6. Report the RATA data and results in EDR RTs 610 and 611 and report the bias test results in RT 611.

Ozone season, monthly, 3-run (minimum) relative accuracy audits (RAAs), described below, shall commence in May 2006. A RAA shall be performed in every calendar month of the ozone season (May through September) in which the unit operates for at least 56 hours, except for a month in which a full 9-run (minimum) RATA or PEMS recertification is performed. Justification for these ozone season RAAs is provided in Attachment C.

The RAAs shall be done on a lb NO_x/mmBtu basis, and shall be performed using either EPA Reference Methods 7E and 3A in Part 60, Appendix A or a portable analyzer. To the extent practicable, each RAA shall be done at different operating conditions from the previous one. Follow the portable analyzer manufacturer=s recommended maintenance procedures.

The minimum time per RAA run shall be 20 minutes. The reference method traverse point selection shall be consistent with Part 75, Appendix A, section 6.5.6. Alternatively, a single measurement point located at least 1.0 meter from the stack or duct wall may be used without performing a stratification test.

Results of the RAA shall be calculated using Equation 1-1 in Appendix F to Part 60. Bias-adjusted data from the PEMS (using the bias adjustment factor from the most-recent RATA) shall be used in the calculations. The results of the RAA are acceptable if the performance specifications in the "PEMS Ongoing QA/QC Tests" table in paragraph (b) are met. If the RAA is failed, follow the provisions in paragraph (g). No grace periods are allowed.

Report the results of all RAAs in the appropriate quarterly electronic data report. Use EDR RT 624, and report the results of each test as either "pass" or "fail". Report the QA test code in column 53 of RT 624 as "05".

If a portable chemiluminescent NO_x analyzer is used to perform the required RAAs, the procedures of Method 7E in Part 60, Appendix A-4 shall be followed. The analyzer performance specifications in Method 7E for calibration error, system bias, and calibration drift shall be met.

If a portable electrochemical analyzer is used to perform the required RAAs, ASTM Method D6522-00[2], as modified below, shall be followed. ASTM D6522-00 applies to the measurement of NO_x (NO and NO_2), CO, and O_2 concentrations in emissions from natural gas-fired combustion systems using electrochemical analyzers. The method was developed based on studies sponsored by the Gas Research Institute (GRI)[3]. It has also been peer-reviewed, approved by ASTM Committees D22.03 and D22, and accepted by EPA as a conditional test method (CTM-030). ASTM D6522-00 prescribes analyzer design specifications, test procedures, and instrument performance requirements that are similar to the checks in EPA=s instrumental test methods (e.g., Methods 7E and 20). These checks include linearity, interference, stability, pre-test calibration error, and post-test calibration error.

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[2] ASTM D6522-00, "Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers."

[3] GRI (Gas Research Institute), "Topical Report, Development of an Electrochemical Cell Emission Analyzer Test Method," July, 1997.

Based on the results of EPA=s portable analyzer study[4], the following modifications to ASTM D6522-00 are required to make the method more practical without sacrificing accuracy: (a) NO_x analyzers must provide readings to 0.1 ppm to improve the likelihood of passing the performance specifications for sources with low NO_x levels; (b) an alternative performance specification (e.g., $\pm$ 1 ppm difference from reference value) will be applied to take account of sources with low concentrations of NO_x; and (c) the measurement system must be purged with ambient air between gas injections during the stability check, to reduce degradation of electrochemical cell performance (see the footnote in the table below).

The measurement system performance specifications as modified by the EPA portable analyzer study are shown in the following table.

ASTM Method D6522-00 Measurement System Performance Specifications (as Modified by EPA Portable Analyzer Study)

Performance Check	Gas	Acceptance Criteria
Zero Calibration Error	NO, NO_2	≤ 3 percent of span gas value or $\pm$ 1.0 ppm difference, whichever is less restrictive
	O_2	≤ 0.3 percent O_2
Span Calibration Error	NO, NO_2	≤ 5 percent of span gas value or $\pm$ 1.0 ppm difference, whichever is less restrictive
	O_2	≤ 0.5 percent O_2
Interference	NO, NO_2, O_2	≤ 5 percent of average stack NO concentration for each test run (using span gas checks)
Linearity	NO, O_2	≤ 2.5 percent of span gas concentration or $\pm$ 1.0 ppm difference, whichever is less restrictive
	NO_2	≤ 3.0 percent of span gas concentration or $\pm$ 1.0 ppm difference, whichever is less restrictive
Stability[1]	NO, NO_2	≤ 2.0 percent of span gas concentration or $\pm$ 1.0 ppm max-min difference, whichever is less restrictive, for 30-minute period
	O_2	≤ 1.0 percent of span gas concentration or $\pm$ 1.0 ppm max-min difference, whichever is less restrictive, for 15-minute period
Cell Temperature		$\pm$ 5 °F from initial temperature

[1] When conducting this check for three cells in an analyzer, the system must be purged with ambient air between gas injections to minimize the possibility of problems with the electrochemical cells. Otherwise, the cells will be exposed to high NO and NO_2 concentrations for prolonged periods of time, which can cause degradation in the cells performance (i.e., the so-called "O_2-starved exposure").

[4] "Evaluation of Portable Analyzers for Use in Quality Assuring Predictive Emission Monitoring Systems for NO_x," The Cadmus Group, Inc., September 8, 2004.

(g) If a RAA or a RATA is failed due to a problem with the PEMS or if changes occur that result in a significant change in NO_x emission rate relative to the previous PEMS training conditions (e.g., turbine aging, process modification, new process operating modes, or changes to emission controls), the following tests and procedures shall be performed *for each applicable fuel* to recertify the PEMS, in this order:

(1) Ensure that the Sensor Validation System meets the requirements of paragraph (c).

(2) Re-train the PEMS according to the manufacturer=s recommendations.[5]

(3) Ensure that the requirements in paragraph (d) are met.

(4) Ensure that requirements in paragraph (e) are met.

(5) Perform a RATA, following the procedures in Part 75, Appendix A, section 6.5, except use three different operating levels (low, mid, and high) as defined in section 6.5.2.1 of Part 75, Appendix A. Use paired PEMS and reference method data to calculate the results on a lb NO_x/mmBtu basis. Calculations shall be based on a minimum of 30 runs at each operating level. BELD shall apply to each operating level the RATA performance specifications contained in the "PEMS Ongoing QA/QC Tests" table in paragraph (b). Report the RATA data and results of only the normal operating level in EDR RTs 610 and 611 and keep the data and results for the other two operating levels on-site, available for inspection. The RATA result for the normal operating level determines when the next RATA is due.

(6) Conduct an F-test, and a correlation analysis (r-test) using Part 75, Subpart E equations at low, mid, and high operating levels.[6] The r-test shall be performed using all data collected at the three operating levels combined. When the mean value of the reference method NO_x data is less

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[5] If a reference method is used to provide training data for the PEMS, the training data may be used to calculate the relative accuracy at each operating level and the normal level bias and to set up the alarm system.

[6] EPA performed a Subpart E statistical analysis of 720 hours of matched pairs of PEMS and CEMS data for one participating combustion turbine and 830 matched data pairs for another, and then performed the same statistics on 30-point subsets of these data. [See "Evaluation and Field Testing of Nitrogen Oxide (NO_x) Predictive Emission Monitoring Systems (PEMS) for Gas-fired Combustion Turbines - Synthesis Report," The Cadmus Group, Inc., December 29, 2004.] The results of these analyses showed that most of the 30-point subsets passed the same combination of statistical tests as the full data set. The field test data also illustrated the importance of testing the PEMS over the full operating range of the unit because of the strong correlation between NO_x emissions to certain unit operating parameters. Based on this evaluation, EPA believes that whenever the PEMS is recertified, a three load RATA (with a minimum of 30 paired data points at each load level) should be required in conjunction with input sensor failure checks and certain abbreviated Subpart E statistical tests; in particular, the F-test, the correlation analysis, and the t-test.

than 5 ppm, data from that operating level may be removed before applying the r-test. The F-test is to be applied to data at each operating level separately. If the standard deviation of the reference method NO_x data at any operating level is less than either 3 percent of the span or 5 ppm, a reference method standard deviation of either 3 percent of span or 5 ppm may be used at that operating level when applying the F-test. Report the F-test and r-test results in RT 641.

(7) Perform a bias test (one-tailed t-test) at the normal operating level for each applicable fuel according to Part 75, Appendix A, section 7.6. If the bias test is failed, calculate and apply a fuel-specific bias adjustment factor (BAF) to the subsequent NO_x emission rate data. Report the bias test results for only the primary fuel in RT 611.

(8) The tests and procedures in this paragraph (g) shall be completed by the earlier of 60 unit operating days (as defined in '72.2) or 180 calendar days after the failed RAA or failed RATA or after the change that caused a significant change in NO_x emission rate. BELD shall use the appropriate Part 75 missing data procedures (see section 5 below), starting from the hour of the failed RAA or RATA and ending with the hour of successful passage or completion of the tests and procedures, as required above. BELD shall report the NO_x MER from paragraph (h) and shall use a Method of Determination Code of "55" (i.e., "Other substitute data approved through petition by EPA") in RT 320 for reporting lb NO_x/mmBtu emission rate, starting with the hour after the change that caused a significant change in NO_x emission rate and ending with the hour of successful passage or completion of the tests and procedures in steps (1) through (7) above. Notification of recertification of the PEMS shall be provided according to '75.61.

(h) For any hour or partial hour of startup (defined as the period from light off to minimum load and until the time steam injection is established), shutdown (defined as the time from loss of steam injection until flame out occurs), or loss of steam injection, BELD must report the NO_x MER, as defined in '72.2. For the purposes of this approval, the MER shall be 0.700 lb/mmBtu when the unit is firing only natural gas, and 1.200 lb/mmBtu when the unit is firing any fuel oil. A Method of Determination Code A55" (i.e., "Other substitute data approved through petition by EPA") shall be used in RT 320 when reporting the MER

5. Missing Data Substitution

Under '75.46, the owner or operator must demonstrate that all missing data can be accounted for in a manner consistent with the applicable missing data procedures in Subpart D (except where alternate procedures are required in this final approval). In the April 25, 2005 petition, BELD states that the PEMS meets the missing data substitution criterion for both the primary operating configuration (natural gas firing at normal load) and the alternative operating configuration (fuel oil firing at normal load) pursuant to the requirements of 40 CFR part 75, Appendix E, sections 2.4 and 2.5. However, BELD shall follow the Subpart D requirements for

missing data substitution, including the missing data procedures and determination of monitor data availability, and also comply with the missing data requirements in Part 75, Appendix D, section 2.4. BELD will maintain a record of which data are substitute data and the reasons for the failure to provide a valid quality-assured hour of NO_x emission rate data.

6. Additional Requirements

BELD shall submit the operating envelope for Potter Unit 3 PEMS to MassDEP and EPA Region 1 for inclusion in the hardcopy monitoring plan. Any time changes are made to the PEMS operating envelope, the complete, revised PEMS operating envelope shall be submitted in a hardcopy monitoring plan by the applicable deadline in ' 75.62(a)(2). More information on monitoring plan submittals, revisions and other submittals can be found at: http://www.epa.gov/airmarkets/monitoring/submissions/ monplan.html.

BELD shall follow the EDR version 2.2 reporting instructions, found at: http://www.epa.gov/airmarkets/reporting/edr21/, in conjunction with the required PEMS record types, and the supplementary EDR reporting instructions attached to this petition response, to report data from the PEMS (see Attachments A and B). Monitoring Data Checking (MDC) software that can be used to quality assure the electronic reports prior to submission is found at: http://www.epa.gov/airmarkets/reporting/index.html.

This approval relies on the accuracy of the information provided by BELD in the April 25, 2005 petition and is appealable under Part 78. If there are any further questions or concerns about this matter, please contact John Schakenbach of my staff at 202-343-9158 or at (schakenbach.john@epa.gov).

Sincerely,

/s/
Sam Napolitano, Director
Clean Air Markets Division

cc: John Schakenbach, EPA, CAMD
Louis Nichols, EPA, CAMD
Theresa Alexander, EPA, CAMD
Alan Hicks, EPA Region 1
Ian Cohen, EPA Region 1
Patricio Silva, MassDEP
John Winkler, MassDEP

Attachments

Attachment A

BASIC EDR REPORTING FOR PREDICTIVE EMISSIONS MONITORING SYSTEMS (PEMS)

I. Introduction

Table A-15, below includes the essential EDR record types for units that have received approval under Subpart E of Part 75 to use PEMS to report NO_x emissions. The scope of Table A-15 is limited to affected oil and gas-fired units (i.e., boilers and combustion turbines) that:

- X Have a single unit-single stack exhaust configuration; and
- X Use Part 75, Appendix D methodology to quantify unit heat input; and
- X Use Part 75, Appendices D and G to account for SO_2 and CO_2 mass emissions (if the units are in the Acid Rain Program); and
- X Do not co-fire oil and gas.

For PEMS reporting, EDR version 2.2 must be used, since fuel-specific missing data substitution for NO_x emission rate is required. For hourly NO_x emission rate reporting, RT 320 is used. Hourly 200-level records are not reported for either NO_x concentration or diluent gas (O_2 or CO_2) concentration.

II. Interpreting Table A-15

In Table A-15, the first column identifies the record type. The second column gives a brief description of the record type. The third, fourth, and fifth columns indicate whether the record type must be reported for a particular type of submittal. The third column header, "MP," refers to monitoring plan submittals. The fourth column header, "CT," stands for certification or recertification applications. The fifth column header, "QT," refers to electronic data report submittals. The letter codes in columns 3 through 5 are defined as follows:

- Y This record type is required for this type of submittal (monitoring plan, certification/recertification application or electronic data report).
- N This record type is not appropriate for this type of submittal.
- O This record type is appropriate, but optional for this type of submittal.
- A This record type may be required for this submittal. If any doubt exists as to the need to submit this record type, consult the appropriate EDR instructions.
- T This record type is required each time a quality assurance test (e.g., a RATA) is performed.

Column 6 identifies the units covered by the record type as units subject to the Acid Rain Program ("ARP") or units subject to Part 75, Subpart H ("Subpart H").

Table A-15
EDR RECORD TYPES FOR UNITS WITH PEMS

Record Type	Description	MP	CT	QT	Program Applicability and Comments
100	Facility Identification	Y	Y	Y	ARP, Subpart H
101	Record Types Submitted	O	O	O	ARP, Subpart H
102	Facility Location and Identification Information	Y	Y	Y	ARP, Subpart H
300	Operating Data	N	N	Y	ARP, Subpart H $ Report one RT 300 for each hour in the quarter, except when a unit does not operate during the entire quarter. $ For each operating hour, report the fuel combusted in column 64.
301	Quarterly Cumulative Emissions	N	N	Y	ARP $ Quarterly NO_x emission rate is the arithmetic average of the RT 320, col 42 values.
302	Oil Fuel Flow	N	N	Y	ARP, Subpart H $ For ARP units, must be paired with RT 313 when reporting SO_2 mass emissions.
303	Gas Fuel Flow	N	N	Y	ARP, Subpart H $ For ARP units, must be paired with RT 314 when reporting SO_2 mass emissions.
307	Cumulative NO_x Mass Emissions	N	N	Y	Subpart H
313	SO_2 Mass Emissions (Oil)	N	N	Y	ARP
314	SO_2 Mass Emissions (Gas)	N	N	Y	ARP
320	NO_x Emission Rate Estimation	N	N	Y	ARP, Subpart H $ See supplementary reporting instructions.
328	NO_x Mass Emissions	N	N	Y	Subpart H $ See supplementary reporting instructions.
330	CO_2 Mass Emissions Data	N	N	A	ARP $ Report RT 330 for hours in which Equation G-4 is used to determine hourly CO_2 mass emissions for gas or oil-fired units.
331	CO_2 Mass Emissions Estimation Parameters	N	N	A	ARP $ Report RT 331 if you estimate CO_2 mass emissions using fuel sampling and Equation G-1.
504	Unit Information	Y	Y	Y	ARP, Subpart H
505	Program Indicator for Report	Y	Y	Y	ARP, Subpart H
506	EIA Cross Reference Information	Y	Y	Y	ARP, Subpart H
507	Peaking Unit or ARP Gas-Fired Unit Qualification Data	A	A	A	ARP
508	Subpart H Reporting Frequency Change	N	N	A	Subpart H
510	Monitoring Systems/Analytical Components Table	Y	Y	Y	ARP, Subpart H $ See supplementary reporting instructions.

Record Type	Description	MP	CT	QT	Program Applicability and Comments
520	Formula Table	Y	Y	Y	ARP, Subpart H $ Report formulas for SO_2 and CO_2 mass emissions (ARP units, only), NO_x mass emissions (Subpart H units), and unit heat input rate.
531	Defaults and Constants	Y	Y	Y	ARP, Subpart H $ See supplementary reporting instructions.
535	Unit and Stack Operating Load Data	Y	Y	Y	ARP, Subpart H Required for any unit using load-based missing data procedures for NO_x or fuel flow rate.
536	Range of Operation, Normal Load, and Load Usage	Y	Y	Y	ARP, Subpart H $ Report RT 536 to define operating range and normal load for RATA testing.
540	Fuel Flowmeter Data	Y	Y	Y	ARP, Subpart H
550	Reasons for Monitoring System Downtime or Missing Parameter	N	N	A	ARP, Subpart H $ See supplementary reporting instructions.
556	Monitoring System Recertification, Maintenance, or Other Events	N	Y	A	ARP, Subpart H $ Report RT 556 for recertification of the PEMS or fuel flowmeters. $ See supplementary reporting instructions.
585	Monitoring Methodology Information	Y	Y	Y	ARP, Subpart H $ See supplementary reporting instructions.
586	Control Equipment Information	A	A	A	ARP, Subpart H
587	Unit Fuel Type	Y	Y	Y	ARP, Subpart H
610	RATA and Bias Test Data	N	Y	T	ARP, Subpart H $ Report RT 610 each time a RATA is performed for certification, recertification or for on-going QA/QC. $ See supplementary reporting instructions.
611	RATA and Bias Test Results	N	Y	T	ARP, Subpart H $ Report RT 611 each time a RATA is performed for certification, recertification or for on-going QA/QC. $ See supplementary reporting instructions.
624	Other QA Activities	N	N	Y	ARP, Subpart H $ Report RT 624 for PEMS daily QA/QC and for PEMS periodic accuracy checks using a reference method, or a portable analyzer. $ See supplementary reporting instructions.
627	Fuel Flowmeter Accuracy Test	N	A	T	ARP, Subpart H $ Report only for fuel flowmeters that are certified and quality assured by periodic accuracy tests according to Part 75, Appendix D, section 2.1.5.1 or 2.1.5.2.
628	Fuel Flowmeter Accuracy Test for Orifice, Nozzle and Venturi Flowmeter	N	A	T	ARP, Subpart H $ Report only for orifice, nozzle and venturi-type flowmeters that are quality assured by periodic transmitter/transducer calibrations.
629	Fuel Flow-to-load Ratio Test Baseline Data	N	N	A	ARP, Subpart H $ Report if quarterly fuel flow-to-load ratio test in Part 75, Appendix D, section 2.1.7 is used to extend fuel flowmeter accuracy test deadlines.
630	Quarterly Fuel Flow-to-load Ratio Test Results	N	N	A	ARP, Subpart H $ Report if quarterly fuel flow-to-load ratio test in Part 75, Appendix D, section 2.1.7 is used to extend fuel

Record Type	Description	MP	CT	QT	Program Applicability and Comments
					flowmeter accuracy test deadlines.
640	Alternative Monitoring System Approval Petition Data	N	Y	A	ARP, Subpart H $ Report when certifying a PEMS.
641	Alternative Monitoring System Approval Petition Results and Statistics	N	Y	A	ARP, Subpart H $ Report when certifying or recertifying a PEMS.
696	Fuel Flowmeter Accuracy Test Extension	N	N	A	ARP, Subpart H $ Use RT 696 to claim allowable extensions of fuel flowmeter accuracy test deadlines.
697	RATA Deadline Extension or Exemption	N	N	A	ARP, Subpart H $ Report when claiming a RATA deadline extension under Part 75, Appendix B, section 2.3.3.
699	QA Test Extension Based on Grace Period	N	N	A	ARP, Subpart H $ Report when claiming a QA test deadline extension under Part 75, Appendix B, section 2.2.4.
900	Certifications	Y	Y	Y	ARP
901	Certifications	Y	Y	Y	ARP
910	Comments	Y	Y	Y	ARP, Subpart H $ See supplementary reporting instructions.
920	Comments	O	O	O	ARP, Subpart H
940	Certifications	Y	Y	Y	Subpart H
941	Certifications	Y	Y	Y	Subpart H
999	Contact Information	O	O	O	ARP, Subpart H

Attachment B

SUPPLEMENTARY EDR REPORTING INSTRUCTIONS FOR PEMS

For a unit with an approved petition to use a predictive emissions monitoring system (PEMS), use the following supplementary instructions, in conjunction with the EDR version 2.2 Reporting Instructions document, to prepare the required EDR submittals.

RT 320

Monitoring System ID (10). Report the monitoring system ID (from RT 510, column 13) of the PEMS used to determine the NO_x emission rate during the hour.

F-Factor (26). Leave this field blank.

Average NO_x Emission Rate for the Hour (36). Report the average unadjusted NO_x emission rate for the hour (lb/mmBtu), rounded to three decimal places, as determined by the PEMS. For hours in which you use missing data procedures, leave this field blank.

Adjusted Average NO_x Emission Rate for the Hour (42). For each hour in which you report NO_x emission rate in column 36, apply the appropriate adjustment factor (1.000 or the BAF) to the unadjusted average emission rate, and report the result rounded to three decimal places. For each hour in which you use missing data procedures, report the appropriate substitute value.

Formula ID (50). Leave this field blank.

Method of Determination Code (53). Report "03" when you use the PEMS to determine the NO_x emissions rate. Report "12" when you report the fuel-specific maximum NO_x emission rate (e.g., during hours of startup or shutdown or when NO_x controls (if any) are not functioning properly). During hours when you use other missing data procedures, report the appropriate MODC listed in the EDR instructions.

RT 328

NOx Methodology for the Hour (45). Report "NOXR-PEMS".

RT 510

The PEMS monitoring system consists of either one or two data acquisition and handling system (DAHS) components. For single-component PEMS systems or for systems where the PEMS software and standard DAHS software have the same manufacturer/provider, model or version number, report one RT 510 for the PEMS system. If the PEMS software and the standard DAHS software have different manufacturer/providers, model or version numbers, report each as a separate RT 510 with the same PEMS monitoring system ID.

Component ID (10). Report the three-character alphanumeric ID for each DAHS component.

Monitoring System ID (13). Create a unique three-character alphanumeric ID for each PEMS monitoring system. Define a separate NO_x PEMS system for each fuel type. For sources switching from NO_x CEMS or Part 75, Appendix E to PEMS, do not re-use the CEMS or Appendix E system ID numbers.

System Parameter Monitored (17). If your PEMS is approved for NO_x emission rate (lb/mmBtu) and if you use the NO_x emission rate to calculate NO_x mass emissions, report "NOx" for the system parameter monitored. If your PEMS is approved for NO_x concentration (ppm) and if you calculate NO_x mass emissions as the product of NO_x concentration times flow rate, report "NOXC" for the system parameter monitored.

Primary/Backup Designation (21). Report "PE" to indicate that this is a predictive emissions monitoring system.

Component Type Code (23). Report "DAHS" as the component type code.

Sample Acquisition Method (27). Leave this field blank.

Manufacturer (30). Report the name of the manufacturer or developer of the software component.

Model/Version (55). Report the model/version of the software component.

Serial Number (70). Report the serial number, if applicableCotherwise leave blank.

RT 531

Parameter (10). Report "NORX" as the parameter monitored. (You should report one 531 record for each fuel type.)

Default Value (14). Report the fuel-specific maximum potential NO_x emission rate (MER), in units of lb/mmBtu.

Units of Measure (27). Report "LBMMBTU".

Purpose or Intended Use (34). Report "MD" for missing data.

Type of Fuel (37). Report the fuel type code for the fuel. (See the EDR Instructions for RT 531 for the list of available codes.)

Indicator of Use (40). Report "A" for any hour.

Source of Value (41). Report "DEF" for default value.

RT 550

Parameter (10). Report "NOX".

Monitoring System ID (14). Report the monitoring system ID, from RT 510, of the NO_x PEMS system.

RT 556

Component ID (10). Report the PEMS component ID subject to recertification/diagnostic testing, if a specific component is involved. If the event is system, not component, specific, leave this field blank.

Monitoring System ID (13). Report the monitoring system ID, from RT 510, of the NO_x PEMS system.

Event Code (16). Report code "99" (i.e., "Other").

Code for Required Test (19). Codes for PEMS systems are:

80 PEMS sensor validation system (minimum data capture check), train or retrain (if manufacturer recommends), sensor validation system (alarm system set-up and failed sensor alert check), daily QA/QC, 3 operating level RATA, statistical tests, and normal operating level bias test;

81 PEMS daily QA/QC, and PEMS check with reference method or portable analyzer;

Beginning of Conditionally Valid Period (31, 39). If conditional data validation is used, report the date and hour that the probationary PEMS daily QA/QC test was successfully completed according to the provisions of '75.20(b)(3)(ii).

Note: For PEMS, you may only use conditional data validation if the "event" in column 16 requires RATA testing. If you elect to use conditional data validation, you must complete the RATA within the allotted time in '75.20(b)(3)(iv).

RT 585

Parameter (10). If your PEMS is approved for NO_x emission rate (lb/mmBtu) and if you use the NO_x emission rate to calculate NO_x mass emissions, report "NOXR" as the parameter code associated with the PEMS. If your PEMS is approved for NO_x concentration (ppm) and if you calculate NO_x mass emissions as the product of NO_x concentration times flow rate, report "NOXM" as the parameter code associated with the PEMS. Report one RT 585 for each generic fuel type combusted.

Monitoring Methodology (14). Report "PEMS" as the monitoring methodology for the PEMS.

Missing Data Approach for Methodology (28). Report "FSP75" for the fuel-specific missing data approach for the PEMS methodology.

RT 610

Units of Measure (33). Report "2" (lb/mmBtu) as the units of measure.

Value from CEM System Being Tested (34). Report the average value recorded by the PEMS, for each RATA run.

RT 611

Units of Measure (34). Report "2" (lb/mmBtu) as the units of measure.

Arithmetic Mean of CEM Values (35). Report the arithmetic mean of all the RTs 610 PEMS values associated with the RATA.

Number of Load Levels Comprising Test (133). Report "1" or "3" (if certification or recert).

BAF for a Multiple-Load RATA (134). Leave this field blank.

RT 624

Component ID (10). Report the PEMS software component ID from RT 510.

Monitoring System ID (13). Report the NO_x monitoring system ID from RT 510.

Parameter (16). Report "NOX".

QA Test Activity Description (30). Fill in appropriately.

Reason for Test (51). Report "Q".

QA Test Code (53). Report one of the following codes, as appropriate:

04 PEMS daily QA/QC
05 Periodic check of PEMS accuracy with a portable analyzer, or reference method

RT 640

Submit RT 640 only with the Subpart E application for initial certification of the PEMS. Do not submit RT 640 for PEMS recertification.

Component ID (10). Report the PEMS software component ID from RT 510.

Monitoring System ID (13). Report the NO_x monitoring system ID from RT 510.

RT 641

Submit RT 641 with the Part 75, Subpart E application for initial certification of the PEMS and for all recertifications of the PEMS. For initial certification, fill in all applicable data fields in RT 641. For PEMS recertification, report only the data elements in start columns 1 through13, column 95 (the F-statistic), column 108 (Critical value of F at 95% confidence level for sample size), and column 121 [Coefficient of correlation (Pearson=s r) of CEM and AMS data].

Component ID (10). Report the PEMS software component ID from RT 510.

Monitoring System ID (13). Report the NO_x monitoring system ID from RT 510.

RT 910

Text (4). Briefly describe the PEMS.

Attachment C

JUSTIFICATION FOR RAA TESTING OF THE PEMS

A. Background

A NO_x PEMS is a piece of software that provides an indirect determination of NO_x emissions. It can provide an accurate indication of NO_x levels if it is properly developed, trained, and quality-assured. Normally, a PEMS is trained over a one week (or longer) time period and over a wide range of source operating conditions. However, even the best training regimen cannot include all possible operating conditions, e.g., upsets, sticky valves, or other unforeseen events, that can affect emissions but are not reflected in the PEMS output.

One safeguard against this is to implement a PEMS algorithm that identifies potentially failed sensors and PEMS input parameters that are outside of the expected range of values, by comparing the readings from each sensor to several other sensors and determining expected sensor values based on the historical sensor relationships developed during PEMS training. When unacceptable sensor values are identified, an alarm is activated, the PEMS is considered out-of-control, and the maximum potential NO_x emission rate must be reported until the sensor is fixed or the PEMS is retrained. Reporting standard missing data values or allowing a substitute sensor value calculated by the PEMS is not a complete solution because the PEMS cannot determine whether the abnormal input parameter value is caused by a failed sensor or by some new region of operation not represented in the PEMS training data.

An even better safeguard against unforeseen events that can affect NO_x emissions but may not be reflected in the PEMS output is to periodically compare the PEMS output to a quality assured, direct measurement of stack emissions, e.g., by performing a RATA. However, RATAs are costly and are generally performed only once or twice a year. Therefore, other, less-expensive accuracy checks should be done in-between the RATAs, to provide ongoing assurance of data quality. For continuous emission monitoring systems (CEMS), the RATAs are supplemented by daily calibration error checks and quarterly linearity checks, which use calibration gases. However, these tests cannot be done on a PEMS, because calibration gas cannot be injected into a PEMS. Therefore, some other type of periodic accuracy check suitable for a PEMS is needed to supplement the RATAs, in order to adequately quality assure the PEMS data for use in a cap and trade program.

EPA has completed a field study of portable NO_x monitors, analyzed the results, and performed a cost assessment[7]. For the two natural gas-fired combustion turbines tested, the accuracy of the portable analyzers at NO_x concentration levels of 3 ppm and higher was found to be comparable to that of a certified Part 75 CEMS and to EPA Reference Method 7E. Thus, portable analyzers are suitable for periodic accuracy tests of a PEMS.

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[7] "Evaluation of Portable Analyzers for Use in Quality Assuring Predictive Emission Monitoring Systems for NO_x," The Cadmus Group, Inc., September 8, 2004.

B. Monthly 3-Run Relative Accuracy Audits in the Ozone Season

EPA believes that monthly 3-run relative accuracy audits (RAAs) performed during the ozone season using a portable analyzer will provide the necessary additional QA for the PEMS installed on Potter Unit 3 under the NO_x Allowance Trading Program. The monthly frequency was chosen by EPA as a compromise between a daily and a quarterly check of the PEMS against a direct emission measurement. Because the NO_x Allowance Trading Program is concerned with controlling ozone, EPA decided that performing monthly RAAs on the PEMS during the ozone season (May through September) is an appropriate level of quality assurance.

C. Cost Analysis

EPA has assessed the potential cost associated with an RAA requirement. The Agency estimates that performing the additional five monthly RAAs during the ozone season and two RAAs during the non-ozone season using a portable analyzer with trained in-house staff would bring the total annual cost of operating, maintaining and quality-assuring a PEMS such as the one on Potter Unit 3 to approximately $29,850. (If outside contractors are used, instead of in-house staff, the total annual cost would be $49,750). This cost includes $6,000 annualized equipment cost for a portable analyzer plus $7,750 operation and maintenance (O&M) costs associated with QA testing (including an annual 9-run RATA performed by an outside test contractor, and seven 3-run RAAs performed by in-house staff using a portable analyzer), and $15,000 for PEMS O&M. This represents an annualized increase of about $9,850 above the cost without the seven RAAs.

EPA believes that the cost of the additional RAAs is reasonable. According to EPA=s CEM Cost Model, the next least costly option for Potter Unit 3 to comply with Subpart H of Part 75 would be NO_x-diluent CEMS. The total annual cost of operating and maintaining a CEMS is estimated at $62,700. This cost includes $15,000 annualized equipment cost plus $47,700 O&M costs (including an annual RATA). Thus, even with the additional RAA requirement, the estimated annual cost of operating and maintaining a PEMS at Potter Unit 3 using trained in-house staff and a portable analyzer would be less than half the cost associated with CEMS. Even if outside contractors are used instead of in-house staff, the annual PEMS cost would be about 21 percent less ($12,950 less) than the annual cost associated with a CEMS.