

March 16, 2015

Mr. Curtis Warner  
Designated Representative  
Arkansas Electric Cooperative Corporation  
P.O. Box 194208  
Little Rock, Arkansas 72219-4208

Re: Request for Changes to the PEMS Approval for Units G1 through G7 at the Arkansas Electric Cooperative Corporation's Harry L. Oswald Generating Station (Facility ID (ORISPL) 55221)

Dear Mr. Warner:

The United States Environmental Protection Agency (EPA) has reviewed the April 5, 2013 letter submitted by the Arkansas Electric Cooperative Corporation (AECC), in which AECC requested changes to the quality assurance (QA) requirements for the predictive emissions monitoring systems (PEMS) installed on Units G1 through G7 at the Harry L. Oswald Generating Station. EPA partially approves the request, with conditions, as discussed below.

### **Background**

AECC owns and operates the Harry L. Oswald Generating Station (Oswald), which is a 510 megawatt (MW) combined-cycle combustion turbine plant located in Pulaski County, Arkansas. The plant consists of six General Electric LM6000 Aero derivative combustion turbines (Units G1 through G6), one General Electric Frame 7EA combustion turbine (Unit G7), and two steam turbines. This plant configuration is commonly known as a 7 on 2, meaning that seven combustion turbines (CTs), or fewer, provide steam to one or both steam turbines depending on the power demand. Each CT combusts only natural gas and is equipped with a duct burner to provide supplemental heat. To control emissions of nitrogen oxides (NO<sub>x</sub>), Units G1 through G6 use steam injection and Unit G7 uses dry low NO<sub>x</sub> (DLN) technology.

According to AECC, Units G1 through G7 are subject to the Acid Rain Program and to the Cross-State Air Pollution Rule (also known as the Transport Rule or TR) NO<sub>x</sub> Ozone Season Trading Program. AECC is therefore required to continuously monitor and report NO<sub>x</sub>, sulfur dioxide (SO<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>) emissions and heat input for these units in accordance with 40 CFR Part 75. AECC has installed and certified continuous emission monitoring systems (CEMS) to meet the NO<sub>x</sub>

monitoring requirements. Each NO<sub>x</sub> monitoring system includes a NO<sub>x</sub> concentration monitor and an oxygen (O<sub>2</sub>) monitor. These monitoring systems provide NO<sub>x</sub> and O<sub>2</sub> readings every minute which are sent to a common data acquisition and handling system (DAHS). The DAHS calculates hourly NO<sub>x</sub> emission rates for each CT in units of pounds per million Btu (lb/mmBtu). Each calendar quarter, these NO<sub>x</sub> emission rates and other required plant data are reported electronically to EPA. Each CEMS undergoes the periodic quality assurance testing required under Appendix B to Part 75, including daily calibration error tests, quarterly linearity checks, and semiannual or annual relative accuracy test audits (RATAs).

In a February 17, 2012 petition, AECC requested permission to replace the hardware NO<sub>x</sub> CEMS at Oswald Units G1 through G7 with PEMS as alternative monitoring systems under Subpart E of Part 75. EPA reviewed the petition and the supplementary data provided by AECC to evaluate compliance with the requirements of Subpart E and approved the request, with conditions, in a letter dated November 21, 2012.

In an April 5, 2013 letter, AECC requested that EPA approve the following changes to the quality assurance / quality control (QA/QC) and missing data substitution conditions of the November 21, 2012 approval:

- 1) Removal of the sensor failure performance test requirements;
- 2) Removal of the requirement to record daily QA/QC checks;
- 3) Revision and eventual removal of the requirement to perform relative accuracy audits; and
- 4) Revision of the maximum potential NO<sub>x</sub> emission rates that are used for missing data substitution.

### **EPA's Determination**

For the reasons described below, EPA approves in part and denies in part AECC's requested changes. EPA has also revised other conditions in the November 21, 2012 approval; these additional revisions are also discussed below. The conditions of approval as revised are stated in full following the discussion of the revisions.

#### **1) Removal of the sensor failure performance test requirements**

Item 1(d) in the November 21, 2012 PEMS approval letter requires that AECC perform sensor failure performance tests to identify the worst-case accuracy for each sensor. The test assesses the accuracy of data values reported by the PEMS under conditions when one individual sensor or each of certain specified combination of sensors has failed, and the results of the test are used to determine the maximum number of sensors that may be allowed to fail before data from the PEMS are considered invalid. AECC claims that because the Oswald PEMS are currently programmed to consider data from the PEMS invalid upon the failure of any two sensors, there is no need to determine the maximum number of sensors (greater than one) that may be allowed to fail and the sensor failure performance test requirement is therefore unnecessary.

EPA concurs that as long as AECC continues to invalidate the PEMS output data upon the failure of any two sensors, the requirements specified in item 1(d) in the November 21, 2012 PEMS approval letter to test combinations of failed sensors are unnecessary; however, because AECC wishes to consider data from the PEMS valid after one sensor has failed, AECC must still perform tests to determine that the failure of each individual sensor in isolation will not result in a difference between the expected PEMS result and the tested PEMS result greater than 10%. EPA has revised the approval conditions accordingly.

## **2) Removal of the requirement to record daily QA/QC checks**

Item 1(e) in the PEMS approval letter requires that AECC must perform, pass, and record the results of a daily QA/QC test each day during which the unit operates for any portion of the day. The test evaluates the ability of the PEMS to consistently produce predicted output values in response to known input parameters, and at least one pass/fail result must be recorded each operating day. AECC claims that AECC's more frequent sensor validation routines already surpass Part 75 requirements and also claims that the pass/fail reporting requirement "is not required by the regulations."

EPA rejects AECC's claims regarding the PEMS daily QA/QC testing and recording requirements and denies AECC's request to remove the requirements. Section 75.45 requires the owner or operator of a unit using a PEMS either to demonstrate that daily tests equivalent to those specified in Appendix B of Part 75 can be performed on the alternative monitoring system or to demonstrate and document that such tests are unnecessary for providing quality-assured data. The daily PEMS QA/QC test described above can be performed and AECC has not demonstrated or documented that it is unnecessary for providing quality-assured data. The test verifies that the PEMS can produce correct data values on a daily basis and mirrors similar requirements to conduct daily QA/QC checks for CEMS and stack gas flow monitors, specifically the daily calibration error tests for gas concentration analyzers and the daily flow interference checks for stack gas flow rate monitors described in sections 2.1.1 and 2.1.2 of Appendix B to Part 75, respectively. Similar to these Appendix B tests, the PEMS daily QA/QC test checks the ability of the monitoring system to accurately provide data directly used in emissions computations. AECC's PEMS sensor validation routines, while important, do not address the continued ability of the PEMS to accurately convert the measured operating parameters into data values directly used in emissions computations and therefore do not serve the same function as the specified daily QA/QC test.

AECC's contention that the requirement to record daily QA/QC checks is not "required by the regulations" is misplaced. Authorization to use an alternative monitoring system is obtained on a case-by-case basis through a petition approval process under Subpart E and §75.66. EPA's discretion under §75.66(a) to approve or disapprove a petition for use of an alternative monitoring system includes the authority to impose reasonable conditions of approval so that the purposes of Subpart E and the broader purposes of Part 75 will be served by the approval. In order to ensure that PEMS data are appropriately quality-assured, EPA considers it reasonable for the results of PEMS daily QA/QC tests to be recorded, just as the results of the equivalent daily QA/QC tests for other types of monitoring systems are required to be recorded.

### 3) Revision and removal of the requirement to perform relative accuracy audits

Item 1(f) in the November 21, 2012 PEMS approval letter requires a 3-run relative accuracy audit (RAA) to be performed in each month in which the unit operates for at least 56 hours except for months in which a relative accuracy test audit (RATA) is performed. The approval letter states that each RAA should be performed at different operating conditions than the previous RAA to the extent practicable. AECC asked EPA to revise this requirement as follows:

- a) Require an RAA to be performed quarterly rather than monthly, and only in each QA operating quarter<sup>1</sup> in the first year and in one QA operating quarter in the second year. If the PEMS passes each of those RAAs, then the RAAs would be discontinued. If the PEMS fails an RAA, then the requirement to perform quarterly RAAs would be extended for one year. AECC states that this change would be consistent with requirements under 40 CFR Part 60.
- b) Require only one RAA per model of combustion turbine rather than an RAA for each individual unit (in other words, allow AECC to omit RAAs for five of the six LM6000 combustion turbines).
- c) Require the RAAs to be performed at a single load rather than performing successive RAAs at different operating conditions. AECC states that this change is necessary because the Oswald units never operate at any load other than full load.
- d) Allow a grace period for performance of any required RAAs, similar to the grace period allowed for quarterly QA/QC tests of hardware CEMS. AECC states that this would provide flexibility in the event of equipment failures and other unforeseen delays as well as scheduled outages.

In addition to the reasons offered for specific requested changes as noted above, AECC asserts that RAAs are unnecessary for the Oswald PEMS because of the continuous learning methodology employed by the PEMS, in which the PEMS are checking themselves continuously. AECC also claims that “RAAs are not a regulatory requirement.”

EPA denies AECC’s request to altogether remove the RAA requirement or to terminate the requirement after a certain number of RAAs have been passed. With respect to AECC’s claim that RAAs are not a regulatory requirement, EPA again notes that the contention is misplaced because EPA’s discretion under §75.66(a) to approve or disapprove petitions to use alternative monitoring systems includes the authority to impose reasonable conditions of approval so that the purposes of Subpart E and the broader purposes of Part 75 will be served by the approval. For QA/QC of Acid Rain Program units with CEMS, EPA requires owners or operators to perform daily calibration error tests and quarterly linearity checks of installed gas monitors in accordance with Appendix B to Part 75. These tests require the owner or operator to compare CEMS readings to known standards, specifically the concentrations of calibration gases. Since PEMS do not have the ability to read reference calibration gases, EPA believes that a periodic comparison of PEMS data to measurements made with EPA reference methods or with portable analyzers is needed to provide a level of quality assurance comparable to the level provided for CEMS by calibration error tests and linearity checks.

EPA also denies the request to limit the RAA requirement to one unit per model of combustion turbine. With limited exceptions, Part 75 QA/QC requirements apply to individual units (or stacks), not

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<sup>1</sup> A “QA operating quarter” is a calendar quarter in which a unit operates for at least 168 hours.

to one unit in a set of similar units. Testing of individual units is generally necessary because individual units can experience unique issues affecting the quality of the monitored data. AECC has offered no rationale for making an exception in this instance.

However, upon consideration, EPA has determined that the AECC's other requested changes to the RAA requirement are reasonable and should be granted. First, EPA is changing the frequency of the RAA requirement from monthly to quarterly (i.e., once per QA operating quarter). As noted above, RAAs for PEMS serve the function of providing comparisons of monitoring system measurements to known standards, analogous to the functions of daily calibration error tests and quarterly linearity checks for CEMS. The original monthly frequency of the RAA requirement for PEMS was chosen as a compromise between the daily frequency of calibration error tests and the quarterly frequency of linearity checks for CEMS. Subsequent to the November 21, 2012 PEMS approval letter for the Oswald units, EPA has reviewed the results of the 466 RAAs reported from 2006 through 2014 for all PEMS approved under Subpart E. The passing rate for these RAAs was 100%. Based on this very high observed passing rate, EPA has determined that the monthly RAA frequency may be reduced to quarterly while continuing to ensure that the reliability of PEMS data is comparable to the reliability of data obtained using CEMS, consistent with the purposes of Subpart E.

Second, EPA is granting the request for a grace period equivalent to the grace period available to units subject to the quarterly QA/QC requirements for gas monitors (i.e., linearity checks). Thus, if the required RAA is not performed by the end of the calendar quarter in which it is due, AECC has a subsequent 168 operating hour grace period in which to perform the required RAA. If the RAA is not completed prior to the 169<sup>th</sup> operating hour after the end of the quarter in which the test was due, then data from the PEMS shall be considered invalid starting on that hour, and shall remain invalid until a subsequent RAA is passed.

Finally, although EPA believes that the previous language calling for successive RAAs to be performed at different operating conditions "to the extent practicable" did not actually require AECC to perform RAAs at loads other than full load if indeed the units never operate at any load other than full load, EPA has revised the language to avoid suggesting an unintended requirement.

#### **4) Revision of the maximum potential NO<sub>x</sub> emission rate**

Item 1(h) of the November 21, 2012 PEMS approval letter requires AECC to use a maximum potential NO<sub>x</sub> emission rate (MER) of 0.700 lbs NO<sub>x</sub>/mmBtu for Units 1 through 7. In the April 5, 2013 letter, AECC requested revised NO<sub>x</sub> MERs of 0.330 lbs/mmBtu for Units 1 through 6 and 0.200 lbs/mmBtu for Unit 7. In a March 11, 2014 email, AECC revised its requested MER for Units 1 through 6 to 0.380 lbs/mmBtu. AECC has stated that the requested rates are better representations for the Oswald units and include startups and shutdowns.

EPA has reviewed the hourly 2012 and 2013 NO<sub>x</sub> emission rate data for the Oswald units and has determined that the quality assured hourly NO<sub>x</sub> emission rate exceeded 0.380 lbs/mmBtu for Units 1 through 6 and exceeded 0.200 lbs/mmBtu for Unit 7 on several occasions. EPA therefore denies AECC's request to revise the MER to 0.380 lbs/mmBtu for Units 1 through 6 and 0.200 lbs/mmBtu for Unit 7. However, EPA is revising the previous condition of approval specifically requiring AECC to use a MER

of 0.700 lbs/mmBtu. Instead, AECC may determine the MER in accordance with the provisions of section 2.1.2.1(b) of Appendix A to Part 75. Further, AECC may use the “maximum controlled NO<sub>x</sub> emission rate” (MCR) instead of the MER during hours in which add-on emission controls are documented to be operating properly consistent with the provisions of §75.34.

In addition to addressing the changes requested by AECC, EPA has revised other provisions of the November 21, 2012 petition approval in order to remove unnecessary requirements, simplify and clarify the conditions of approval, provide greater consistency with Part 75 CEMS requirements, and ensure that data provided by the PEMS have the same or better precision, reliability, accessibility, and timeliness as data provided by CEMS, consistent with the purposes of Subpart E of Part 75.

As discussed above, EPA has revised the sensor failure performance test requirements in the November 21, 2012 PEMS approval letter in order to eliminate requirements to test combinations of failed sensors. These tests are unnecessary given AECC’s decision to invalidate data from the PEMS upon the failure of any two sensors. However, AECC must conduct the sensor failure performance test for each individual sensor in isolation. The revised requirements are set forth in section 1(a) below.

In section 1(b) below, EPA has made two changes to the minimum data capture requirements. First, EPA has removed the requirement that the critical input parameters for each minute be represented in the historical training dataset. Because only one parameter value can be a calculated replacement value before the one minute PEMS output data is considered invalid, this requirement is no longer necessary. Successful completion of the sensor failure performance test procedures just discussed will serve to demonstrate the accuracy of the PEMS output when a single sensor fails and its value is replaced with a calculated value. Second, EPA has revised the upper and lower validity limits of input parameters from 5% above the maximum values and 5% below the minimum values specified in the operating envelope to the actual maximum and minimum values specified in the operating envelope. This revision both simplifies the hourly data validation and strengthens the assurance that the input data from which the PEMS determines reported emissions data are representative of the input data with which the PEMS was trained.

In section 1(c) below, EPA has added a requirement to retain the results of the daily QA/QC tests on-site in a form suitable for inspection for at least three years. This revision is consistent with the CEMS daily QA/QC recordkeeping provisions of §75.57.

In section 1(d) below, EPA has added a requirement to electronically report detailed RAA run data in addition to the already required “pass” or “fail” RAA results. This requirement will enable EPA to verify the RAA results to ensure correct reporting. Also, this level of electronic reporting detail is comparable to the level of electronic reporting detail required for the quarterly linearity checks performed on CEMS. The reporting instructions are provided in revisions to section 4.0 of the Supplementary ECMPS Reporting Instructions for PEMS.

In sections 1(d) and 1(e) below, EPA has removed the requirements to retrain the PEMS when a RAA or RATA is failed, respectively. Instead, the PEMS is considered to be out-of-control until a subsequent RAA or RATA is passed. This revision simplifies the requirements and is consistent with Part 75 CEMS requirements when a monitor fails a RATA.

In section 1(f) below, EPA has provided additional flexibility for recertifying the PEMS by adding the option to follow the initial demonstration procedures in Subpart E of Part 75 if and when retraining of the PEMS becomes necessary. This section has also been simplified by removing the requirement to collect 24 or more hours of startup and shutdown data when retraining the PEMS because this requirement is not present in Subpart E for the initial training of a PEMS.

**Revised Conditions of Approval**

The revised conditions of this approval are as follows:

1. The owner or operator shall implement the following QA/QC procedures according to Table 1 and paragraphs (a) through (g). The sensor failure performance test procedure is described in paragraph (a); the minimum data capture requirements are described in paragraph (b); the daily QA/QC test is described in paragraph (c); the 3-run relative accuracy audits (RAAs) are described in paragraph (d); the relative accuracy test audits (RATAs) and bias adjustment factors (BAFs) are discussed in paragraph (e); re-training and recertifying the PEMS is discussed in paragraph (f); and the maximum potential and maximum controlled NO<sub>x</sub> emission rates (MER and MCR) are discussed in paragraph (g).

**Table 1. Required PEMS QA/QC Tests**

Test	Performance Specification	Frequency	Reference
Sensor Failure Performance Test	PEMS output $\pm$ 10% of the expected PEMS output	After initial training, re-training, or recertification	Paragraph (a)
Minimum Data Capture	At least 1 valid data point (i.e., minute) per 15 minute quadrant	Hourly	Paragraph (b)
Daily QA/QC Test	Absolute value of (unbiased PEMS output - PEMS output produced from RATA or PEMS training) $\leq$ 0.002 lb NO <sub>x</sub> /mmBtu	Daily	Paragraph (c)
3-run Relative Accuracy Audits (RAAs)	<ul style="list-style-type: none"> <li>• Accuracy <math>\leq</math> 10.0%</li> </ul> <p style="text-align: center;"><u>or</u></p> <ul style="list-style-type: none"> <li>• For a low emitting source, results are acceptable if the mean value for the PEMS is within <math>\pm</math> 0.020 lb/mmBtu of the reference mean value</li> </ul>	Quarterly	Paragraph (d)
Relative Accuracy Test Audits (RATAs)	<p><u>For semiannual RATA frequency:</u></p> <ul style="list-style-type: none"> <li>• RA <math>&gt;</math> 7.5% and <math>\leq</math> 10.0%</li> </ul> <p style="text-align: center;"><u>or</u></p> <ul style="list-style-type: none"> <li>• For a low emitting source (i.e., the mean reference value during the RATA or RAA is <math>\leq</math> 0.200 lb/mmBtu NO<sub>x</sub>), results are acceptable if the mean value for the PEMS is within <math>\pm</math> 0.020 lb/mmBtu of the reference method mean value</li> </ul>	<p>Semiannual or annual (depending on the RATA results) for routine QA (see §75.74(c)(2)(ii))</p> <p>Recertification RATA is required when operating conditions change.</p>	Paragraph (e)

**Table 1. Required PEMS QA/QC Tests**

Test	Performance Specification	Frequency	Reference
Sensor Failure Performance Test	PEMS output $\pm$ 10% of the expected PEMS output	After initial training, re-training, or recertification	Paragraph (a)
	<p>For annual RATA frequency:</p> <ul style="list-style-type: none"> <li>• <math>RA \leq 7.5\%</math></li> <li style="text-align: center;">or</li> <li>• For a low emitting source source (i.e., the mean reference value during the RATA or RAA is <math>\leq 0.200</math> lb/mmBtu NO<sub>x</sub>), results are acceptable if the mean value for the PEMS is within <math>\pm 0.015</math> lb/mmBtu of the reference method mean value</li> </ul>	<p><math>\geq 9</math> test runs are required at normal operating level for annual or semiannual QA</p> <p><math>\geq 30</math> test runs are required at each of 3 operating levels for recertification</p>	
PEMS Recertification <ul style="list-style-type: none"> <li>• F-test</li> <li>• Linear correlation</li> </ul>	$F_{critical} \geq F$ ; and $r \geq 0.8$	As needed	Paragraph (f)
Bias adjustment factor (BAF)	If $d_{avg} \leq  cc $ , bias test is passed	After each RATA. Perform bias test at the normal operating level	Paragraph (f)

**(a) Sensor Failure Performance Test**

An initial demonstration shall be conducted to verify that the use of a calculated replacement sensor value in lieu of a monitored sensor value for each input parameter results in a PEMS output within 10 percent of the expected PEMS output (i.e., the expected NO<sub>x</sub> emission rate).

(1) Input a set of reference sensor values for the parameters listed in Table 2 (applies to Units 1-6) and Table 3 (applies to Unit 7) at a minimum of four different PEMS training conditions over the entire range of expected turbine operations. The set of reference sensor values must have been recorded during either a PEMS training or a RATA and must be within the PEMS operating envelope. Verify that these reference sensor inputs produce the expected PEMS output.

(2) Artificially fail a sensor and calculate the replacement value for that failed sensor. In lieu of the monitored sensor value, input the calculated replacement sensor value. If the PEMS output is within 10.0 percent of the expected PEMS output, then the calculated replacement sensor values are considered valid until the PEMS is either re-trained or recertified as required under section 1(f), at which time a new sensor failure performance test must be conducted. Repeat this procedure for each sensor, individually.

The results of this demonstration shall be maintained on-site in a form suitable for inspection.



**(b) Minimum Data Capture**

Each PEMS on Units 1-6 shall use the input parameters listed in Table 2 below and the Unit 7 PEMS shall use the input parameters listed in Table 3 below to predict NO<sub>x</sub> emission rates. Additional input parameters may be used in conjunction with those listed in Tables 2 and 3. The sensors for the PEMS input parameters must be maintained in accordance with the manufacturer's recommendations and each PEMS input parameter value shall be monitored as a one minute average.

Each one-minute average value of a particular PEMS input parameter that is greater than or equal to the minimum value and less than or equal to the maximum value shown in Table 2 or 3 below (referred to as "the PEMS operating envelope") shall be considered valid data. The one-minute average NO<sub>x</sub> emission rate (lb/mmBtu) shall be determined only for those minutes in which all of the sensor input parameter values are valid (i.e., a valid monitored sensor value or valid calculated replacement sensor value). Only one calculated replacement sensor value may be used during any individual minute. If more than one parameter is a calculated replacement sensor value, then the one-minute NO<sub>x</sub> emission rate shall not be considered valid and shall not be used to determine the hourly NO<sub>x</sub> emission rate. The hourly NO<sub>x</sub> emission rate shall be the average of all valid one-minute NO<sub>x</sub> emission rates. The one-minute NO<sub>x</sub> emission rates used to calculate the hourly NO<sub>x</sub> emission rates shall be, to the extent practicable, evenly spaced over the hour.

(Note: For an operating hour in which the NO<sub>x</sub> emission controls are not operational for part, but not all, of the hour (e.g., during unit startup), the hourly average NO<sub>x</sub> emission rate reported for that hour may be calculated using the maximum potential NO<sub>x</sub> emission rate (MER) for the uncontrolled minutes and the quality-assured NO<sub>x</sub> emission rates for the controlled minutes (this is consistent, conceptually, with Question 19.9 in the "Part 75 Emissions Monitoring Policy Manual").

To comply with the minimum data capture requirements of §75.10(d)(1), hourly averages must be computed using at least one valid NO<sub>x</sub> emission rate (i.e., one-minute average) in each fifteen-minute quadrant of an hour in which the unit operates. However, an hourly average may be computed from at least two valid NO<sub>x</sub> emission rates separated by a minimum of 15 minutes (where the unit operates for more than one quadrant of an hour) if data are unavailable as a result of: (1) the performance of calibration, quality assurance, or preventive maintenance activities, (2) conducting backups of data from the DAHS, or (3) re-training and recertifying the PEMS, pursuant to paragraph (f), below.

If there is no valid hourly average NO<sub>x</sub> emission rate for a given operating hour, data from the PEMS shall be considered invalid, and the owner or operator shall report substitute NO<sub>x</sub> emission rate data using the standard missing data routines in §75.33(c) for each hour starting with the first out-of-control hour and ending with the next valid hour. Notwithstanding this requirement, as an alternative to the standard missing data procedures, the maximum potential NO<sub>x</sub> emission rate (MER) or the maximum controlled NO<sub>x</sub>

emission rate (MCR), calculated according to paragraph (g), may be reported for each hour of the out-of-control period, as follows. For any full or partial operating hour during the out-of-control period in which the add-on NO<sub>x</sub> emission controls are not in operation or the dry low-NO<sub>x</sub> controls are not in the premixed (low-NO<sub>x</sub>) mode for the entire time, the MER must be reported. For any full or partial operating hour during the out-of-control period in which parametric data are available to document that the NO<sub>x</sub> emission controls were fully engaged and operating properly for the entire time, the MCR may be reported. Data from each PEMS input parameter shall be maintained on-site in a form suitable for inspection for at least three years.

**Table 2. Harry L. Oswald Generating Station Units G1 through G6 Pavilion8® Software PEMS Operating Envelope**

PEMS Input Parameter	Minimum Value	Maximum Value
Duct Burner (DB) Gas Flow (scfh)	0.0	200,000.0
CT Gas Flow (scfh)	0.0	504,000.0
CT Steam Injection (lb)	0.0	38,860.0
CT By-Pass Vane Position (%)	0.0	100.0
CT Sprint Water Flow (gal/min)	0.0	17.0
Relative Humidity (%)	0.0	100.0

**Table 3. Harry L. Oswald Generating Station Unit G7 Pavilion8® Software PEMS Operating Envelope**

PEMS Input Parameter	Minimum Value	Maximum Value
Duct Burner (DB) Gas Flow (scfh)	0.0	270,000.0
HRSG High Pressure Steam Flow (klb)	0.0	546.0
CT HP Compressor Discharge Pressure (psia)	0.0	187.0
HP Compressor Discharge Temp (°F)	0.0	846.0
CT Gas Flow (scfh)	0.0	1,069,937.0
CT Combustion Reference Temp (°F)	0.0	2500.0
CT Inlet Guide Position (%)	0.0	94.0
Relative Humidity (%)	0.0	100.0

**(c) Daily QA/QC Test**

The following daily QA/QC test must be performed whenever the unit operates for any portion of the day. At least once per operating day, the owner or operator shall input to the PEMS a set of test parameters consisting of at least the PEMS input parameters identified in tables 2 or 3, as applicable, which were recorded 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 PEMS shall use the test input parameters to calculate an unbiased daily test NO<sub>x</sub> emission rate (lb/mmBtu).<sup>2</sup> If the difference between the unbiased daily test NO<sub>x</sub> emission rate calculated by the PEMS using the test input parameters and the NO<sub>x</sub> emission rate which was calculated at the time of the RATA or PEMS training is within  $\pm 0.002$  lb NO<sub>x</sub>/mmBtu, the daily QA/QC test is passed.

If the daily QA/QC test is performed and passed more than once per day with no test failures, the owner or operator shall, at a minimum, report the results of one of these daily checks (pass/fail) in the Daily Test Summary Records. To the extent practicable, the results shall be reported at the same time of day on each unit operating day. The results of all failed daily QA/QC tests must be reported. See section 2.2 of the Emissions Collection and Monitoring Plan System (ECMPS) Emissions Reporting Instructions. Data from all reported daily QA/QC tests shall be maintained on-site in a form suitable for inspection for at least three years.

If the results of a daily QA/QC test are reported as “failed”, the PEMS is considered to be out-of-control, and the owner or operator shall report either: (1) standard Part 75 substitute data; (2) the MER; or, if applicable, (3) the MCR, as described in paragraph (g) for each hour starting with the hour of the failed daily QA/QC test and ending with the hour in which a daily QA/QC test is passed.

#### **(d) Relative Accuracy Audits**

A three-run (minimum) relative accuracy audit (RAA) of each unit shall be performed (as described below) in each calendar quarter in which the unit operates for at least 168 operating hours (i.e., in each “QA operating quarter”), except for a quarter in which a full 9-run RATA or PEMS recertification, as described in paragraph (f), is performed. (Note: a RATA may be performed in lieu of any required RAA.)

All required RAAs shall be done on a lb NO<sub>x</sub>/mmBtu basis. To the extent practicable, each RAA shall be done at normal operating conditions.

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 with bias-adjusted data as determined from the most recent RATA. The results of the RAA are acceptable if the performance specifications listed in Table 1, above are met.

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<sup>2</sup> The resulting daily test NO<sub>x</sub> emission rate, if bias-adjusted, shall be divided by the bias adjustment factor (BAF) currently in use (this removes the BAF by resetting it to 1.000, as it was during the passed PEMS RATA or most recent PEMS training).

To perform the required RAA, the procedures of Methods 7E and 3A in 40 CFR Part 60, Appendices A-4 and A-2 (respectively) shall be followed, except as otherwise provided below. The analyzer performance specifications in Method 7E for calibration error, system bias, and calibration drift shall be met.

Alternatively, portable electrochemical analyzers maintained using the manufacturer's recommended maintenance procedures may be used to perform the required RAA. ASTM Method D6522-00,<sup>3</sup> as modified below, shall be followed. ASTM D6522-00 applies to the measurement of NO<sub>x</sub> (NO and NO<sub>2</sub>), CO, and O<sub>2</sub> 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).<sup>4</sup> 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., Method 7E). These checks include linearity, interference, stability, pre-test calibration error, and post-test calibration error.

Based on the results of EPA's portable analyzer study,<sup>5</sup> the following modifications to ASTM D6522-00 are required to make the method more practical without sacrificing accuracy:

- 1) NO<sub>x</sub> analyzers must provide readings to 0.1 ppm to improve the likelihood of passing the performance specifications for sources with low NO<sub>x</sub> levels;
- 2) An alternative performance specification (i.e.,  $\pm 1.0$  ppm difference from reference value) may be applied to take account of sources with low concentrations of NO<sub>x</sub>; and
- 3) 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 Table 4 below).

The measurement system performance specifications, as modified by the EPA portable analyzer study, are shown in Table 4.

If the RAA is failed or if the RAA is aborted prior to completion due to a problem with the PEMS, data from the PEMS shall be considered invalid, and the owner or operator shall

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<sup>3</sup> 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."

<sup>4</sup> GRI (Gas Research Institute), "Topical Report, Development of an Electrochemical Cell Emission Analyzer Test Method," July 1997.

<sup>5</sup> "Evaluation of Portable Analyzers for Use in Quality Assuring Predictive Emission Monitoring Systems for NO<sub>x</sub>," The Cadmus Group, Inc., September 8, 2004.

report either: (1) standard Part 75 substitute data; (2) the MER; or, if applicable, (3) the MCR, as described in paragraph (g) for each operating hour, starting with the hour in which the RAA is failed or aborted until the hour of completion of a subsequent successful RAA.

If the required RAA is not completed prior to the end of the calendar quarter in which it is due, the owner or operator has a 168 operating hour “grace period” in which to perform the required RAA. The grace period begins with the first operating hour after the end of the quarter in which the RAA was due. If the RAA is not completed prior to the 169<sup>th</sup> operating hour after the end of that quarter, data from the PEMS shall be considered invalid, starting with that hour, and the owner or operator shall report either: (1) standard Part 75 substitute data; (2) the MER; or, if applicable, (3) the MCR, as described in paragraph (g) for each operating hour until the hour of completion of a subsequent successful RAA.

The RAA test data and results shall be maintained on-site in a form suitable for inspection for at least three years and reported using the ECMPS Client Tool as described in attachment A, section 4.0 of the Supplementary ECMPS Reporting Instructions for PEMS.

**Table 4. 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 <sub>2</sub>	≤ 3 percent of span gas value or ± 1.0 ppm difference (whichever is less restrictive)
	O <sub>2</sub>	≤ 0.3 percent O <sub>2</sub>
Span Calibration Error	NO, NO <sub>2</sub>	≤ 5 percent of span gas value or ± 1.0 ppm difference (whichever is less restrictive)
	O <sub>2</sub>	≤ 0.5 percent O <sub>2</sub>
Interference	NO, NO <sub>2</sub> , O <sub>2</sub>	≤ 5 percent of average stack NO concentration for each test run (using span gas checks)
Linearity	NO, O <sub>2</sub>	≤ 2.5 percent of span gas concentration or ± 1.0 ppm difference (whichever is less restrictive)
	NO <sub>2</sub>	≤ 3.0 percent of span gas concentration or ± 1.0 ppm difference (whichever is less restrictive)
Stability*	NO, NO <sub>2</sub> , O <sub>2</sub>	≤ 2.0 percent of span gas concentration or ± 1.0 ppm max-min difference (whichever is less restrictive), for 30-minute period □ or ≤ 1.0 percent of span gas concentration or ± 1.0 ppm max-min difference (whichever is less restrictive), for 15-minute period
Cell Temperature		± 5 °F from initial temperature

\* 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<sub>2</sub> concentrations for prolonged periods of time, which can cause degradation in the cell’s performance (i.e., the so-called “O<sub>2</sub>-starved exposure”).

**(e) Relative Accuracy Test Audits**

Ongoing semi-annual or annual NO<sub>x</sub> relative accuracy test audits (RATAs) of the PEMS installed on Units G-1 through G-7 shall be performed at the normal operating level according to the procedures in Part 75, Appendix B, section 2.3.1 and the relative accuracy 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. After the RATA, the owner or operator shall perform the bias test described in section 7.6.4 of Appendix A to Part 75. If the PEMS is found to have a low bias, the owner or operator shall calculate and apply a bias adjustment factor at the normal operating level according to section 7.6.5 of Appendix A to Part 75.

The results of the RATA are acceptable if the relative accuracy (RA) meets either the main or alternative (low-emitter) performance specifications in Table 1, above. The required test frequency (semiannual or annual) shall be determined based on the results of the RA calculations, as indicated in Table 1.

If the RATA is failed or if the RATA is aborted prior to completion due to a problem with the PEMS, data from the PEMS shall be considered invalid and the owner or operator shall report either: (1) standard Part 75 substitute data; (2) the MER; or, if applicable, (3) the MCR, as described in paragraph (g) for each operating hour starting with the hour in which the RATA is failed or aborted until the hour of completion of a subsequent successful RATA.

The deadline for the next RATA test shall be either two QA operating quarters (if semiannual RATA frequency is obtained) or four QA operating quarters (if an annual RATA frequency is obtained) after the quarter in which the RATA is completed. No grace periods are allowed.

If the RATA is not completed prior to the applicable deadline (either on an annual or semiannual basis), data from the PEMS shall be considered invalid and the owner or operator shall report either: (1) standard Part 75 substitute data; (2) the MER; or, if applicable, (3) the MCR, as described in paragraph (g) for each hour starting with the first unit operating hour following the quarter in which the RATA was due until the hour of completion of a subsequent successful hands-off RATA.

The RATA data and results shall be maintained on-site in a form suitable for inspection for at least three years and reported as described in section 2.4 of the ECMPS Quality Assurance and Certification Reporting Instructions.

## **(f) Re-training and recertifying PEMS**

If circumstances occur that result in a significant change in the NO<sub>x</sub> emission rate relative to the previous PEMS training conditions (e.g., turbine degradation beyond manufacturer specifications, process modification, new process operating modes, or changes to emission controls), the owner or operator must re-train the PEMS according to the manufacturer's recommendations and recertify the CEMS by either: (1) demonstrating that the PEMS has the same or better precision, reliability, accessibility, and timeliness as that provided by a CEMS by following the initial alternative monitoring systems demonstration procedures in Subpart E of Part 75; or (2) performing the procedures in paragraphs (f)(i) through (iii) below:

- (i) Perform a RATA, following the procedures in Part 75, Appendix A, section 6.5, at 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<sub>x</sub>/mmBtu basis. Calculations shall be based on a minimum of 30 runs at each operating level.<sup>6</sup>

For each operating level, the relative accuracy (RA) must meet the performance specifications contained in Table 1, above.

Report the RATA data and results of only the normal operating level as described in section 2.4 of the ECMPS Quality Assurance and Certification Reporting Instructions, and keep the data and results of all three operating levels on-site in a form suitable for inspection.

If the RATA results for the normal operating level meet either the main or alternative (low-emitter) RA specification in Table 1, above, for a semiannual test frequency, but do not meet either of the specifications for an annual test frequency, the deadline for the next RATA shall be two QA operating quarters after the calendar quarter in which the normal operating level RATA was completed.

If the RATA result for the normal operating level meets either the main or alternative (low-emitter) RA specification in Table 1, above, for an annual test frequency, the deadline for the next RATA shall be four QA operating quarters after the calendar

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<sup>6</sup> In 2004, EPA performed Subpart E statistical analyses of 720 hours of matched pairs of PEMS and CEMS data for one combustion turbine and 830 matched data pairs for another, and then computed the same statistics for 30-point subsets of these two data sets. See "Evaluation and Field Testing of Nitrogen Oxide (NO<sub>x</sub>) 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 sets. The field test data also illustrated the importance of testing a PEMS over the full operating range of the unit because of the strong correlation between NO<sub>x</sub> emissions to certain unit operating parameters. Based on this evaluation, EPA believes that whenever a 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 certain abbreviated Subpart E statistical tests, in particular, the F-test, the correlation analysis, and the t-test.

quarter in which the normal operating level RATA was completed.

- (ii) In order to demonstrate the precision of the PEMS, conduct an F-test, and a correlation analysis (r-test) as described in §75.41(c) at low, mid, and high operating levels.

The F-test is to be applied to data at each operating level separately. If the standard deviation of the reference method NO<sub>x</sub> 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 calculated F-value, and the critical value of F at the 95-percent confidence level with n-1 degrees of freedom, for each operating level. If the calculated F-value is greater than the critical value, the results are unacceptable.

The r-test shall be performed using all data collected at the three operating levels combined. However, when the mean value of the reference method NO<sub>x</sub> data is less than 5 ppm for an operating level, data from that operating level may be removed before applying the r-test. Report the calculated r-value (using Equation 27 in §75.41(c)(2)(ii)) for data from the three operating levels combined, in accordance with section 4.0 of the ECMPS Quality Assurance and Certification Reporting Instructions. If the calculated r-value is less than 0.8, the results are unacceptable. Maintain the F-test and r-test results on-site for at least three years, in a form suitable for inspection.

- (iii) Perform a bias test (one-tailed t-test) at the normal operating level according to Part 75, Appendix A, Section 7.6.4.

If a bias test is failed, calculate and apply a BAF to the subsequent NO<sub>x</sub> emission rate data. Report the bias test results as described in section 2.4.2 of the ECMPS Quality Assurance and Certification Reporting Instructions. Maintain the bias test results on-site for at least three years, in a form suitable for inspection.

- (iv) The tests and procedures in paragraphs (f)(i) through (iii) above or the initial alternative monitoring systems demonstration procedures in Subpart E of Part 75 shall be completed by the earlier of 60 unit operating days (as defined in 40 CFR 72.2) or 180 calendar days after the start of the circumstances that caused a significant change in the NO<sub>x</sub> emission rate. In accordance with §75.63(a)(2)(i), a recertification application for the PEMS shall be submitted no later than 45 days after successfully completing all of the required tests and procedures in this paragraph (f). Pursuant to §§75.63(a)(2)(ii), (b)(1)(ii), and (b)(2)(ii), the results of the tests shall be submitted: (1) to the Administrator in electronic format, using the ECMPS Client Tool; and (2) in hard copy to the applicable EPA Regional Office and to the appropriate State or local air pollution control agency (unless the requirement is waived by either or both of those offices).
- (v) In accordance with §§75.20(a)(3) and (a)(4), upon successful completion of the tests and procedures in paragraphs (f)(i) through (iii) above or the initial alternative monitoring systems demonstration procedures in Subpart E of Part 75, the PEMS shall



be considered to be provisionally recertified for a period not to exceed 120 days after a complete application has been received. Data from a provisionally recertified PEMS may be reported as quality-assured unless the Administrator issues a notice of disapproval of the recertification application within 120 days after receiving it. If the Administrator fails to issue either a notice of approval or disapproval within 120 days of receiving the application, the PEMS shall be deemed recertified. The loss of certification provisions of §75.20(a)(5) shall apply in the event that the Administrator issues a notice of disapproval of the recertification application within the 120-day review period.

- (vi) For circumstances that cause a significant change in NO<sub>x</sub> emission rate, the owner or operator shall report the NO<sub>x</sub> MER from paragraph (g), below, or, if applicable, the MCR and shall use a Method of Determination Code (MODC) of “55”, i.e., “Other substitute data approved through petition by EPA” to report NO<sub>x</sub> emission rate (lb/mmBtu), starting with the first hour of the event(s) that caused a significant change in NO<sub>x</sub> emission rate and ending with the hour of successful completion of the tests and procedures in paragraphs (f)(i) through (iii) above (see section 2.4.2 of the ECMPS Emissions Reporting Instructions). Notification of recertification of the PEMS shall be provided according to §75.61.

**(g) Maximum Potential and Maximum Controlled NO<sub>x</sub> Emission Rates**

For the purposes of this approval, the maximum potential NO<sub>x</sub> emission rate (MER) in lb/mmBtu for Units G-1 through G-7 shall be determined according to section 2.1.2.1(b) of Appendix A to Part 75<sup>7</sup> and the maximum controlled NO<sub>x</sub> emission rate (MCR) shall be calculated according to the basic procedure described in section 2.1.2.1(b) of Appendix A to Part 75, except that the words “maximum potential NO<sub>x</sub> emission rate (MER)” shall be replaced with the words “maximum controlled NO<sub>x</sub> emission rate (MCR)” and the NO<sub>x</sub> maximum expected concentration (MEC) shall be used instead of the NO<sub>x</sub> MPC.

- 2. Except where the option to report the NO<sub>x</sub> MER or MCR is exercised (as allowed under paragraph 1(g) and elsewhere in these revised conditions of approval), the owner or operator must ensure that the DAHS will automatically provide appropriate substitute data values in accordance with Subpart D of Part 75 for each unit operating hour in which a quality-assured hourly average NO<sub>x</sub> emission rate is not obtained. The Subpart D missing data substitution requirements for NO<sub>x</sub> emission rate include, but are not limited to: the initial missing data procedures in §75.31; determination of the percent monitor data availability in §75.32; and the standard missing data

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<sup>7</sup> The NO<sub>x</sub> MPC used to calculate the MER shall be determined using one of the five Options in section 2.1.2.1(a) of Appendix A to Part 75. The selected option must be represented in the electronic monitoring plan, and the MPC value must be periodically reviewed in accordance with section 2.1.2.1(c). If Option 3 (emission test results) is chosen, follow the instructions in section 2.1.2.1(d). If Option 4 (historical CEMS data) is chosen, the NO<sub>x</sub> MPC shall be based on a minimum of 720 hours of historical CEMS data. The CEMS data must include periods when the add-on NO<sub>x</sub> emission controls are not in operation or when the dry low NO<sub>x</sub> controls are not in the premixed (low-NO<sub>x</sub>) mode, and the highest NO<sub>x</sub> concentration (ppm) value recorded during these periods shall be the MPC.

procedures in §75.33. The missing data substitution requirements for fuel flow rate are found in Part 75, Appendix D, section 2.4.

3. If changes are made to the PEMS operating envelope, the owner or operator shall submit the complete, revised PEMS operating envelope to EPA by the applicable deadline in §75.62(a)(2).
4. To report emissions data from the PEMS, the owner or operator shall follow the current published ECMPS reporting instructions in conjunction with the supplementary, PEMS-specific ECMPS reporting instructions attached to this approval.

EPA's determination relies on the accuracy of the information provided by AECC in the February 17, 2012 petition and the October 17, 2012 and April 5, 2013 letters and is appealable under 40 CFR Part 78. If there are any further questions or concerns about this matter, please contact Travis Johnson of my staff at (202) 343-9018 or at [johnson.travis@epa.gov](mailto:johnson.travis@epa.gov). Thank you for your continued cooperation.

Sincerely,

/s/

Reid P. Harvey, Director  
Clean Air Markets Division

cc: Travis Johnson, CAMD  
Raymond Magyar, EPA Region VI  
Alan Breshears, Arkansas DEQ

Attachment

# **Attachment A**

## **Supplementary ECMPS Reporting Instructions for PEMS**

For a unit with an approved petition to use a predictive emissions monitoring system (PEMS), use the following PEMS-specific supplementary instructions, in conjunction with the ECMPS reporting instructions, to prepare the required submittals. Unless otherwise noted, for fields or data elements not specifically addressed in these instructions, you should follow the ECMPS reporting instructions. These guidelines are organized by the three ECMPS submittal types: 1) Monitoring Plan, 2) Quality Assurance and Certification, and 3) Emissions Reporting.

### **I. Monitoring Plan Reporting Instructions**

#### **Section 6.0---Monitoring Method Data**

**Parameter Code.** Report a "NOXR" for NO<sub>x</sub> Rate.

**Monitoring Method Code.** Report "PEM" to indicate NO<sub>x</sub> rate is calculated using a petition approved PEMS methodology.

**Substitute Data Code.** Report "SPTS"

#### **Section 7.0---Component Data**

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 DAHS component. If the PEMS software and the standard DAHS software have different manufacturer/providers, model or version numbers, report two DAHS components. Otherwise report the DAHS components normally as you would according to section 7.0 of the ECMPS Monitoring Plan Reporting Instructions. You may also report the additional components of "DL" to indicate a data logger or recorder or "PLC" to indicate a programmable logic controller.

#### **Section 8.0---Monitoring System Data**

**Monitoring System ID.** Assign a unique three character alphanumeric ID for each PEMS monitoring system.

**System Type Code.** Report system type code "NOXP" to indicate this is a NO<sub>x</sub> emission rate PEMS system.

**System Designation Code.** Report "P" to indicate this is the primary monitoring system.

## **Section 8.2---Monitoring System Component Data**

Associate each DAHS component with the NOXP system described as above. While you may associate additional components such as a data logger or a programmable logic controller with the system, a PEMS must have a minimum of one associated DAHS component.

## **Section 10.0---Monitoring Default Data**

**Parameter Code.** Report "NOXR" as the parameter monitored. (You must report one default record for each fuel type.)

**Default Value.** Report the fuel specific maximum potential NO<sub>x</sub> emission rate (MER), in units of lb/mmBtu.

**Default Units of Measure Code.** Report "LBMMBTU".

**Default Purpose Code.** Report "MD" for missing data.

**Fuel Code.** Report "NFS" to indicate Non-Fuel-Specific.

**Operating Condition Code.** Report "A" for any hour.

**Default Source Code.** Report "DATA" to indicate the value was determined from unit/stack testing.

## **II. Quality Assurance and Certification Instructions**

### **Section 2.4.2---RATA Data**

**Number of Load Levels.** Report "1".

***Note:*** On-going RATAs are performed at the normal operating level only. Recertifications are performed following procedures in Part 75, Appendix A, section 6.5, using three operating levels (low, mid, and high) as defined in section 6.5.2.1 of Part 75, Appendix A. Only the normal operating level data is reported; the data for the other two operating levels are kept on-site.

**Relative Accuracy.** Report the result of the relative accuracy test, as required and defined for the appropriate test method and in Part 75, Appendix A. Leave this field blank for a RATA that is aborted prior to completion due to a problem with the monitoring system.

**RATA Frequency Code.** Report "2QTRS" (for semiannual frequency) or "4QTRS" (for annual frequency), depending on the RATA results.

**Overall Bias Adjustment Factor.** Report the overall bias adjustment factor (BAF) for the system determined from the RATA data

### **Section 2.4.3---RATA Summary Data**

**Mean CEM Value.** Report the arithmetic mean of the PEMS values for the normal operating level.

**Bias Adjustment Factor.** Report the BAF for each passing RATA performed at the normal operating level.

### **Section 2.4.4---RATA Run Data**

**CEM Value.** Report the average value recorded by the PEMS, for each RATA run.

### **Section 4.0---Miscellaneous Tests**

Both the 3-run Relative Accuracy Audit (RAA) and the PEMS training (linear correlation and F-test) QA test results are reported using the miscellaneous test type.

To report the 3-run RAA tests using the miscellaneous test type do the following:

**Test Type Code.** Report "PEMSACC" for a 3-run RAA performed with a reference method or portable analyzer.

**Monitoring System ID.** Report the PEMS NO<sub>x</sub> monitoring system ID.

**Test Result Code.** Report "Pass" or "Fail", as applicable.

**Test Comment.** For each run, report the reference method or portable analyzer reading and the PEMS reading as specified by the PEMS petition approval.

To report the PEMS training tests (linear correlation and F-tests) do the following:

**Test Type Code.** Report "OTHER".

**Monitoring System ID.** Report the PEMS NO<sub>x</sub> monitoring system ID.

**Test Reason Code.** Report either "INITIAL" or "RECERT", as applicable.

**Test Description.** Report either "PEMS Initial Certification" or "PEMS Recertification", as applicable.

**Test Comment.** Report the results of the F-test and correlation analysis (r-test) as specified by the PEMS petition approval.

## **Section 5.0---OA Certification Event Data**

**Monitoring System ID.** Report the monitoring system ID of the NO<sub>x</sub> PEMS system.

**OA Cert Event Code.** Report the appropriate PEMS specific event code. (See section 5.0, Table 42 of the ECMPS Quality Assurance and Certification Reporting Instructions for a list of appropriate event codes).

**Required Test Code.** Report the appropriate PEMS specific required test code. (See section 5.0, Table 43 of the ECMPS Quality Assurance and Certification Reporting Instructions for a list of appropriate required test codes).

**Conditional Begin Date.** 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).

**Conditional Begin Hour.** If applicable report the hour during which conditional data validation began.

### **III. Emissions Reporting Instructions**

#### **Section 2.2---Daily Test Summary Data**

**Monitoring System ID.** Report the three character Monitoring System ID for the NO<sub>x</sub> PEMS system.

**Component ID.** Report the PEMS software component ID.

**Test Type Code.** Report "PEMSCAL" for daily PEMS calibration tests.

#### **Section 2.4.1---Monitor Hourly Value Data**

Do not report a Monitor Hourly Value record. PEMS hourly data should be reported using the Derived Hourly Value records as discussed below.

#### **Section 2.4.2---Derived Hourly Value Data**

**Parameter Code.** Report "NO<sub>x</sub>R".

**Unadjusted Hourly Value.** Report the average unadjusted NO<sub>x</sub> emission rate for the hour, rounded to three decimal places, as determined by the PEMS. For hours in which you use missing data procedures, leave this field blank.

**Adjusted Hourly Value.** For each hour in which you report NO<sub>x</sub> emission rate in unadjusted hourly value, apply the appropriate bias adjustment factor (BAF) to the unadjusted average NO<sub>x</sub> emission rate, and report the result rounded to three decimal places. If the bias test is passed, the BAF will be 1.000. For each hour in which you use missing data procedures, report the appropriate substitute value.

**MODC Code.** Report a MODC of "03" for each hour in which the PEMS provides a quality-assured NO<sub>x</sub> emissions rate. Report a MODC of "55" when you report the fuel-specific maximum potential NO<sub>x</sub> emission rate (MER). During hours when you use other missing data procedures, report the appropriate MODC listed in section 2.5.2, Table 26 of the ECMPS Emissions Reporting Instructions.