

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Air Quality

DOCUMENT NUMBER: 274-0300-001

TITLE: Continuous Source Monitoring Manual

AUTHORITY: 35 P.S. Sec. 4001-4005 (Air Pollution Control Act) and Act 95 (75 PA C.S. Section 4706(I))

POLICY: This manual includes procedures for use in performance and reporting of source emission data.

PURPOSE: This manual contains design specifications, performance specifications, performance test procedures, data storage and reporting requirements, quality assurance criteria, and administrative procedures for obtaining Department approval of continuous source emission monitoring systems or other monitoring systems required pursuant to the Pennsylvania Department of Environmental Protection Rules and Regulations.

DISCLAIMER:

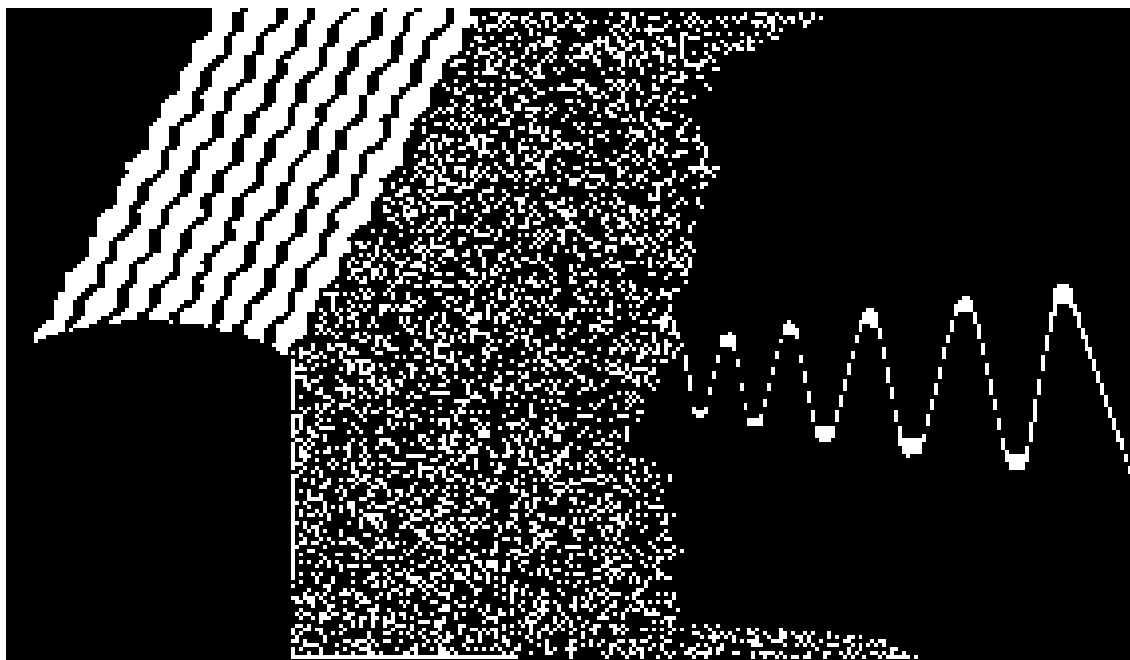
The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of the Department to give these policies and procedures that weight or deference. This document establishes the framework, within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

PAGE LENGTH: 88 pages

LOCATION: Vol 02, Tab 18

**COMMONWEALTH OF PENNSYLVANIA
DEPT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
DIVISION OF SOURCE TESTING
AND MONITORING**



Continuous Source Monitoring Manual

**REVISION NO. 7
2003**

274-0300-001



COMMONWEALTH OF PENNSYLVANIA
Edward G. Rendell, *Governor*
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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APPLICABILITY

For monitoring systems required pursuant to only 40 CFR, Part 64 (Compliance Assurance Monitoring), the criteria published in 40 CFR, Part 64 will apply.

For monitoring systems required pursuant to only 40 CFR, Part 70, Paragraph 70.6(a)(3)(i)(B), ("gap" monitoring), the criteria published by EPA for that purpose will apply.

For monitoring systems required pursuant to only 25 PA Code, Chapter 145 (Interstate Pollution Transport Reduction), the criteria in 25 PA Code, Chapter 145 will apply.

For monitoring systems required pursuant to only 40 CFR, Part 75 (acid rain), the criteria in 40 CFR, Part 75 will apply. Approval for compliance with 40 CFR, Part 75 (even if the monitoring system is also required pursuant to other regulations) must be obtained from the appropriate office(s) of the Federal Environmental Protection Agency.

For all other monitoring systems, the criteria in this manual will apply. The criteria in this manual are designed such that compliance with the criteria also constitute compliance with the criteria of 40 CFR, Part 64 and of 40 CFR, Part 70, Paragraph 70.6(a)(3)(i)(B), thus obviating the need to implement additional monitoring systems for compliance with those requirements. It may be necessary to implement an additional monitoring system (or additional components of a monitoring system) for compliance with 40 CFR, 75, or with 25 PA Code, Chapter 145, where applicable.

Approval for monitoring systems not subject to the criteria in this manual (and choosing not to use the criteria in this manual) must be obtained from the appropriate DEP Regional Office.

NOTE: Approval of alternatives to certain criteria in this manual may be requested in accordance with criteria contained in the following references:

- (1) ``Minimum Emission Monitoring Requirements,`` 40 CFR, Chapter I, Subchapter C, Part 51, Appendix P, Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402-9328.
- (2) ``Standards of Performance for New Stationary Sources,`` 40 CFR, Chapter I, Subchapter C, Part 60, Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402-9328.
- (3) ``Continuous Emission Monitoring,`` 40 CFR, Chapter I, Subchapter C, Part 75, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402-9328.
- (4) A formal approval granted by EPA for compliance with the requirements listed in (1), (2) or (3), above.

Requests for approval of alternatives must be submitted to the Chief of the Division of Source Testing and Monitoring, Bureau of Air Quality. The request must include a description of which of the specific alternative criteria is being requested (including citation of the appropriate paragraph(s) of the reference(s) involved), the reason for the request, and any supporting data.

The Department has the authority to determine which alternatives are applicable.

INTRODUCTION

This manual is not intended to provide step-by-step instructions on designing, selecting, installing, or performance testing of continuous source emission monitoring systems or other monitoring systems. It does contain design specifications, performance specifications, performance test procedures, data storage and reporting requirements, quality assurance criteria, and administrative procedures for obtaining Department approval of continuous source emission monitoring systems or other monitoring systems required pursuant to the Pennsylvania Department of Environmental Protection Rules and Regulations.

The contents of this manual are ordered as follows:

Submittal and Approval

This section contains the administrative procedures for obtaining approval of continuous source emission monitoring systems and other monitoring systems. Included are performance testing requirements which must be met in addition to the general requirements which appear in the attachments listed in the appendix.

Record Keeping and Reporting

This section contains data storage, handling, and reporting requirements.

Quality Assurance

This section contains data validation criteria, data reduction procedures and recalibration requirements.

Appendix

The appendix contains a list of documents that provide information concerning design specifications, installation requirements, performance specifications, performance specification test procedures, and standard electronic data reporting formats.

It is recommended that, prior to design, selection, or installation of any system, equipment, or sites, the most recent revision of this manual be obtained to eliminate controversies which may arise as a result of updating of the information contained herein.

All questions relative to this manual should be directed to the Division of Source Testing and Monitoring, Continuous Emission Monitoring Section, P.O. Box 8468, Harrisburg, PA 17105-8468. This manual and related environmental information are available electronically via the Internet. Access the DEP Website at:

<http://www.dep.state.pa.us>

Access this manual at:

<http://www.dep.state.pa.us/dep/deputate/airwaste/aq/cemspage/cemshome.htm>.

SUBMITTAL AND APPROVAL

Systems will be evaluated on an individual basis. The Department will maintain no approved list of equipment. Final approval will be contingent upon the system meeting the performance standards established by the Pennsylvania Department of Environmental Protection in this manual. The standards, while based on those established in the Code of Federal Regulations, have been modified in order to meet the specific needs of the Department in enforcing its Rules and Regulations. Standards not specified in this manual or in the Department of Environmental Protection Rules and Regulations shall be in accordance with those established in the Code of Federal Regulations.

The approval process will consist of three phases: the initial application, performance testing and final approval. The initial application (Phase I) must be submitted to the appropriate Regional Office (the one in which the source is located). Phases II and III will be coordinated directly between the source owner and the Bureau of Air Quality, Division of Source Testing and Monitoring, Continuous Emission Monitoring Section. Note that changes to approved systems (for example, addition of components, replacement of components, changing of software programs, etc.) are subject to the "Component Addition, Maintenance or Replacement" requirements in the Quality Assurance section of this manual.

INITIAL APPLICATION (PHASE I)

Upon promulgation of a monitoring requirement, the following information must be submitted to the Air Quality Program Manager of the appropriate DEP Regional Office and to the CEM Section Chief of the Bureau of Air Quality Central Office. Department approval of this Phase must be obtained prior to initial startup of new sources and within six months of promulgation of a monitoring requirement for existing sources. This information must indicate the probable capability of a monitoring system to meet all of the regulatory requirements. A monitoring system is considered to be all of the hardware and software used for the determination of a value for compliance with an emission standard, operational criteria or informational reporting requirement. It includes the measurement interface, all necessary measurement devices and associated calibration and data handling apparatus and procedures. Only information concerning one specific proposed system should be submitted. Multiple proposals will not be evaluated. The information must be clearly identified in the submittal. Information must be submitted in an outline format as specified below. If electronic monitoring plan record formats are specified in Attachment No. 3 to this Manual, such records must also be submitted.

I. Continuous Gas, Opacity, "Stack" Flow and Temperature Monitoring Systems

- A. A general description of the process(es) and pollution control equipment. All factors that may affect the operation or maintenance of the monitoring system must be included.
- B. The location of the monitoring system measurement point(s) or path(s) in relation to:
 - 1. Flow disturbances (fans, elbows, inlets, outlets, etc.)
 - 2. Pollution control equipment
 - 3. Emission point of monitored gases to the atmosphere
 - 4. Flue walls at the measurement interface location

Provide a flow diagram that clearly shows the location of the measurement point(s) or path(s). Include any test data and an explanation as to the basis for the choice of the location. Explain reasons for deviations from location criteria in Attachment No. 2 (for gases) or Attachment No. 1 (for opacity).

C. The following system information:

- 1. Pollutant(s) or parameters to be monitored
- 2. A separate document explaining, in detail, the operating principles of the measurement devices
- 3. Number of measurement devices, including number of measurement point(s) or path(s) per device and locations monitored by each. Note that measurement devices must be designated as primary (devices normally used), standby (additional device operated and maintained identical to primary, but not measuring until needed) or backup (additional device not installed until needed). All valid data from primary devices must be used.
- 4. Equipment manufacturer(s) and model number(s)
- 5. Manufacturer's literature
- 6. A copy of the electronics checklist to be used by instrument technicians for periodic checking of the measurement device(s). The checklist must include a description of checks to be done using either on-board diagnostics or electronics test equipment. Normal values or ranges for each check must also be included.
- 7. The expected normal and maximum measurement device readings.

D. Information listed in the tables following this section (as applicable). This information will be verified as part of Phase II.

E. Process and pollution control equipment operating parameters which affect the emission levels of the pollutant(s) being monitored or the parameters being monitored, with an explanation of the method to be used to record these parameters.

F. A step-by-step quality assurance plan, including an explanation of procedures to be used to address all of the items in applicable paragraphs of the Quality Assurance section of this manual.

G. An explanation of procedures to be used to satisfy the Department's requirements as listed in the "Record Keeping and Reporting" section of this manual.

H. The UTM Northing, UTM Easting, UTM Zone, latitude and longitude of the facility main gate (general public entrance) area. For existing facilities, this information may be obtained from the Department. This information is used by the Continuous Emission Monitoring Section for facility identification purposes (not for modeling purposes).

I. For each measurement device, except for fuel flowmeters, opacity, O₂ or CO₂ measurement devices, the equivalent reading at the level of the monitored emission standard(s) (standards monitored by the specific measurement device range) for the system, using values for other measurement devices in the system that would be expected to occur during expected normal operation. These values will be used in calculation of measurement device drift.

Note: If an equivalent emission standard is not well defined in terms of the measurement device output or multiple measurement devices are required to monitor a pollutant or parameter, an alternative equivalent emission standard may be proposed for Department consideration.

II. Coal Sampling/Analysis Systems

A. A general description of the process(es) and pollution control equipment. All factors that may affect the operation or maintenance of the sampling/analysis system must be included.

B. The location of the sample acquisition point(s) in relation to:

1. The point at which the coal is burned
2. Any coal processing devices
3. Pollution control equipment
4. Emission point of pollutant gases to the atmosphere

Provide a flow diagram that clearly shows the location of the sample acquisition point(s). Include any test data and an explanation as to the basis for the choice of the location.

C. A description of the equipment, methods, and procedures to be used to comply with each of the following system design specifications or their equivalent, where applicable (for explanation of terms, see Table VII). Equivalency must be demonstrated to the Department's satisfaction.

1. Points of sample acquisition must be located as close as possible to the point at which the coal is burned.
2. Points of sample acquisition must be located downstream of any coal processing devices, including but not limited to pulverizers, unless an alternate location will yield representative results.
3. A separate point of sample acquisition must be located in each separate coal feed stream to a particular combustion unit unless it can be demonstrated that sampling conducted at fewer points will yield representative results.
4. Sample collection must be by means that do not allow for operator discretion with respect to portions of sample retained or rejected.
5. Sampling devices must comply with ASTM D2234-76, Sections 6.4 through 6.10, unless alternate devices yield representative results.
6. A minimum of two subincrement point samples must be collected from each point of sample acquisition for each discrete hourly time period.
7. An hourly increment point sample must consist of all subincrement point samples collected at a particular sample acquisition point during a discrete hourly time period. Each hourly increment point sample must weigh at least two pounds, except for fluidized, pulverized coal where lower sample weights yield representative results.
8. An hourly increment unit sample must consist of all hourly increment point samples for a particular combustion unit during a particular discrete hourly time period.
9. An hourly increment system sample, which consists of hourly increment unit samples for all combustion units which discharge to a common flue during a particular discrete hourly time period, must accurately represent the actual SO₂ emissions from the flue for that time period.
10. A daily composite unit sample must consist of all subincrement point samples collected for a particular combustion unit during a discrete daily time period.
11. A daily composite system sample, which consists of daily composite unit samples for all combustion units which discharge to a common flue during a particular daily time period, must accurately represent the actual SO₂ emissions from the flue for that time period. Combination of daily

composite unit samples to form daily composite system samples must be conducted in accordance with all applicable quality assurance criteria.

12. For sampling of coal streams other than fluidized, pulverized coal, each subincrement point sample must consist of a Type I, Condition A or B, Spacing 1 sample as specified in ASTM D2234-76.
13. For sampling of fluidized, pulverized coal, each subincrement point sample must consist of a Type I, Condition A, B, or C, Spacing 1 sample as specified in ASTM D2234-76.
14. Subincrement point samples must be collected in proportion to the weight of coal passing the point of sample acquisition during the time period represented by the samples. The factor of proportionality (lbs. sample/lb. coal burned) must be as nearly identical as possible for all sample acquisition points within a particular system.
15. For sampling systems that do not inherently sample on a proportional basis, the following method shall be used to determine the sampling strategy.
 - a. Determine the maximum rated coal burning capacity in lb. per hour for each combustion unit within a system (all units discharging to a common flue).
 - b. Select the unit with the lowest rated coal burning capacity as the base unit.
 - c. Calculate the ideal factor of proportionality for the system by the equation:

$$F_0 = \frac{4N_m}{C_{b0}}$$

Where F_0 = ideal factor of proportionality (lbs. sample/lb. coal burned)

C_{b0} = rated coal burning capacity of base unit (lbs. coal burned/hr.)

N_m = maximum number of sample acquisition points for any unit within the system.

NOTE: Record F_0 retaining two significant digits.

- d. Calculate the subincrement point sample weight for each combustion unit within the system by the equation

$$W_i = \frac{F_0 C_{i0}}{4N_i}$$

Where W_i = subincrement point sample weight for unit i (lbs.)

F_0 = ideal factor of proportionality (lbs. sample/lb. coal burned).

C_{i0} = rated coal burning capacity of unit i (lbs./hr.).

N_i = number of sample acquisition points for unit i.

NOTE: Record W_i retaining two significant digits.

- e. At the beginning of each discrete hourly time period, determine the number and spacing of subincrement point samples to be collected at each point of sample acquisition for each combustion unit within the system according to the following table.

C_{ia}/C_{io}	Number of Subincrements	Spacing
0.00 to 0.50	2	30 minutes
0.51 to 0.75	3	20 minutes
0.76 to 1.00	4	15 minutes

Where C_{ia} = actual coal burning rate for unit i anticipated for the hour (lbs. coal burned/hr.)

C_{io} = rated coal burning capacity for unit i (lbs. coal burned/hr.)

- f. Collect the samples according to the specified weight, numbers, and spacings.
16. Each daily composite unit sample must be weighed prior to combining, in accordance with all quality assurance criteria, to form the daily composite system sample. All data necessary to calculate the actual factors of proportionality (F_{ia}) for daily composite unit samples from each individual combustion unit within the system (i.e., the weight of each daily composite unit sample and the weight of coal burned in the unit during the same daily time period) must be recorded.
 17. Preparation of a 50-gram laboratory sample from each daily composite system sample must be conducted in accordance with ASTM D2013-72 (78) as for Group B samples.
 18. Analysis of each laboratory sample for BTU/lb. must be conducted in duplicate using ASTM D2015-77(78) or methods which produce equivalent results. Results must be recorded on a dry basis.
 19. Analysis of each laboratory sample for percent sulfur must be conducted in duplicate using ASTM D3177-75, Method B- Bomb Washing Method, ASTM D4239-83, or methods which produce equivalent results. Results must be recorded on a dry basis.
 20. Analysis of each laboratory sample for percent moisture must be conducted in accordance with ASTM D3173-73(79) or the appropriate portion of ASTM D3302.
 21. Results for each laboratory sample must be converted to lb. $SO_2/10^6$ BTU using the average values of percent sulfur and BTU/lb. from the duplicate analysis as follows:

$$\bar{S} = (S_1 + S_2) / 2$$

$$\bar{H} = (H_1 + H_2) / 2$$

$$E = (2\bar{S} * 10^4) / \bar{H}$$

Where S_1 = first measured value of percent sulfur

S_2 = second measured value of percent sulfur

\bar{S} = average of S_1 and S_2

H_1 = first measured value of BTU/lb.

H_2 = second measured value of BTU/lb.

\bar{H} = average of H_1 and H_2

E = lbs. $SO_2/10^6$ BTU

22. The calibration error with respect to percent sulfur analysis must be checked at minimum every seven days using an appropriate NIST SRM coal sample.

23. The value of the calorimeter water equivalent must be checked at minimum every seven days using ASTM D2015-77(78), Section 7.
- D. The claimed performance specifications as listed in Table VIII (will be verified as part of Phase II).
- E. Process and pollution control equipment operating parameters which affect the SO₂ emission level, along with an explanation of the method to be used to record these parameters.
- F. A step-by-step quality assurance plan, including an explanation of procedures to be used to address all of the items in applicable paragraphs of the Quality Assurance section of this manual.
- G. An explanation of procedures to be used to satisfy the Department's requirements as listed in the "Record Keeping and Reporting" section of this manual.
- H. The UTM Northing, UTM Easting, UTM Zone, latitude and longitude of the facility main gate (general public entrance) area. For existing facilities, this information may be obtained from the Department. This information is used by the Continuous Emission Monitoring Section only for facility identification purposes (not for modeling purposes).

TABLE I

Specifications for Opacity Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>	
Design	Design and manufacturer's performance specification requirements of ASTM D6216-98.....	Certificate of conformance	
Install.	Monitor pathlength (ft).....	as measured	
	Emission outlet pathlength (ft).....	as measured	
	Range (% opacity).....	0->80	
	Data recorder resolution (%opacity).....	0.5 maximum	
	Number of cycles per minute (measurement).....	6 minimum	
	Number of cycles per minute (recording).....	1 minimum	
	Schedule for zero and calibration checks.....	daily minimum	
	Procedures for zero and calibration checks.....	all system components checked	
	Perform.	Calibration error (% opacity).....	3.0 maximum*
		Zero drift-24 hours (% opacity).....	2.0 maximum*
Calibration drift-24 hour (% opacity).....		2.0 maximum*	
Response time (seconds to 95% response).....		10 maximum	
Averaging period calculation and recording (% opacity).....		2 maximum	
Optical alignment		Indicator devices show proper alignment	
Operational test period (hours without corrective maintenance).....		168 minimum	
Data acquisition system accuracy, 1-minute avgs (% opacity).....		1 maximum**	
Data acquisition system accuracy, 1-hour avgs (% opacity).....		1 maximum**	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

TABLE II

Specifications for Sulfur Dioxide and Nitrogen Oxides Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>	
Install.	Range (ppm).....	0 to >= max. expected & (>=1.25 highest std.)	
	Data recorder resolution (% of lowest std).....	1.0 maximum	
	Data recorder resolution (minutes).....	15 maximum**	
	Number of cycles per hour (meas. and record.).....	4 minimum**	
	Schedule for zero and calibration checks.....	daily minimum	
	Procedures for zero and calibration checks.....	all system components checked	
	Calibration gas ports.....	close to sample point	
	Perform.	Relative accuracy-in terms of standard either (% of reference method).....	20.0 maximum*
		or (% of lowest standard).....	10.0 maximum*
		or (units of standard in ppm).....	5.0 maximum**
or (units of standard in lbs/mm Btu).....		0.02 maximum**	
or (units of standard in % reduction).....		2.0 maximum**	
or (units of standard in lbs/hr).....		5.0 maximum**	
Calibration error (% of actual concentration).....		5.0 maximum*	
or (abs ppm).....		5.0 maximum**	
Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		4.0 maximum*	
Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		5.0 maximum*	
Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		4.0 maximum*	
Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		5.0 maximum*	
Response time (minutes to 95% response).....		15 maximum	
Operational test period (hours without corrective maintenance).....		168 minimum	
Data acquisition system accuracy, 1-hour avgs (% of lowest std).....		1 maximum***	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

TABLE III

Specifications for Oxygen and Carbon Dioxide Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>
Install.	Range (%O ₂ , %CO ₂).....	0-25, 0-20
	Data recorder resolution (%O ₂ or %CO ₂).....	0.1 maximum
	Data recorder resolution (minutes).....	15 maximum**
	Number of cycles per hour (meas. and record.).....	4 minimum**
	Schedule for zero and calibration checks.....	daily minimum
	Procedures for zero and calibration checks.....	all system components checked
	Calibration gas ports.....	close to sample point
Perform.	Relative accuracy-in terms of standard**** either (% of reference method).....	20.0 maximum*
	or (% of lowest standard).....	10.0 maximum*
	or (%O ₂ or %CO ₂).....	1.0 maximum*+
	Calibration error (% of actual concentration).....	5.0 maximum*
	or (%O ₂ or %CO ₂).....	0.5 maximum
	Zero drift-2 hour (%O ₂ or %CO ₂).....	0.4 maximum*
	Zero drift-24 hour (%O ₂ or %CO ₂).....	0.5 maximum*
	Calibration drift-2 hour (%O ₂ or %CO ₂).....	0.4 maximum*
	Calibration drift-24 hour (%O ₂ or %CO ₂).....	0.5 maximum*
	Response time (minutes to 95% response).....	15 maximum
	Operational test period (hours without corrective maintenance).....	168 minimum
Data acquisition system accuracy, 1-hour avgs (% O ₂ or %CO ₂).....	0.1 maximum***	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

*+ For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

**** Only required if data must be reported for compliance with a standard or operational criterion in terms of %O₂ or %CO₂.

TABLE IV

Specifications for Carbon Monoxide Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>	
Install.	Range (ppm) 0 to >= max.....	0 to >=max. expected (>=1.25 x highest std.)	
	Data recorder resolution (% of lowest std).....	1.0 maximum	
	Data recorder resolution (minutes).....	5 maximum**	
	Number of cycles per hour (meas. and record.).....	12 minimum**	
	Schedule for zero and calibration checks.....	daily minimum*	
	Procedures for zero and calibration checks.....	all system components checked	
	Calibration gas ports.....	close to sample point	
	Perform.	Relative accuracy-in terms of standard either (% of reference method).....	10.0 maximum*
		or (% of lowest standard).....	5.0 maximum*
		or (units of standard in ppm).....	5.0 maximum**+
or (units of standard in lbs/mm Btu).....		0.02 maximum	
or (units of standard in lbs/hr).....		5.0 maximum**+	
Calibration error (% of actual concentration).....		5.0 maximum*	
or (abs ppm).....		5.0 maximum*-	
Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I)		10.0 maximum*	
Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		10.0 maximum*	
Response time (minutes to 95% response).....		5 maximum	
Operational test period (hours without corrective maintenance).....		168 minimum	
Data acquisition system accuracy, 1-hour avgs (% of lowest std).....	1 maximum***		

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

**+ For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

TABLE V

Specifications for Total Reduced Sulfur Compound and H₂S Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>	
Install.	Range (ppm).....	0 to >= max. expected & (>=1.25 x highest std.)	
	Data recorder resolution (% of lowest std).....	1.0 maximum	
	Data recorder resolution (minutes).....	15 maximum**	
	Number of cycles per hour (meas. and record.).....	4 minimum**	
	Schedule for zero and calibration checks.....	daily minimum	
	Procedures for zero and calibration checks.....	all system components checked	
	Calibration gas ports.....	close to sample point	
	Perform.	Relative accuracy-in terms of standard either (% of reference method).....	20.0 maximum*
		or (% of lowest standard).....	10.0 maximum*
		or(units of standard in ppm).....	5.0 maximum**
or(units of standard in lbs/hr).....		1.0 maximum**	
Calibration error (% of actual concentration).....		5.0 maximum*	
or (abs ppm).....		5.0 maximum**	
Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		10.0 maximum*	
Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		10.0 maximum*	
Response time (minutes to 95% response).....		15 maximum	
Operational test period (hours without corrective maintenance).....		168 minimum	
Data acquisition system accuracy, 1-hour avgs (% of lowest std).....		1 maximum***	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

TABLE VI

Specifications for Hydrogen Chloride Monitors

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>	
Install.	Range (ppm).....	0 to >= max. expected & (>=1.25 x highest std.)	
	Data recorder resolution (% of lowest std).....	1.0 maximum	
	Data recorder resolution (minutes).....	5 maximum **	
	Number of cycles per hour (meas. and record.).....	12 minimum**	
	Schedule for zero and calibration checks.....	daily minimum	
	Procedures for zero and calibration checks.....	all system components checked	
	Calibration gas ports.....	close to sample point	
	Perform.	Relative accuracy-in terms of standard either (% of reference method).....	20.0 maximum*
		or (% of lowest standard).....	10.0 maximum*
		or (units of standard in ppm).....	5.0 maximum**
or (units of standard in % reduction).....		2.0 maximum**	
Calibration error (% of actual concentration).....		5.0 maximum*	
or (abs ppm).....		5.0 maximum**	
Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		10.0 maximum*	
Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		8.0 maximum*	
Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....		10.0 maximum*	
Response time (minutes to 95% response).....		5 maximum	
Operational test period (hours without corrective maintenance).....		168 minimum	
Data acquisition system accuracy, 1-hour avgs (% of lowest std).....		1 maximum***	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

TABLE VII

DEFINITION OF SAMPLE TERMINOLOGY FOR COAL SAMPLING/ANALYSIS SYSTEMS

<u>Time Period</u>	<u>Term</u>	<u>Can Represent</u>	<u>Definition</u>
(< one hour)	subincrement	point (1)	individual sample collected at a single point
hourly	increment	point	accumulation of (1) for a single point for one hour
		unit	accumulation of (1) for all points in unit for one hour
		system	accumulation of (1) for all units in system for one hour
daily	composite	unit	accumulation of (1) for all points in unit for 24-hours
		system	accumulation of (1) for all units in system for 24 hours

TABLE VIII

COAL SAMPLING PERFORMANCE SPECIFICATIONS

<u>Parameter</u>	<u>Specification</u>
1. Number of subincrement point samples per hour per point of sample acquisition	≥ 2
2. Weight of hourly increment point sample	≥ 2 lbs.
3. Variation of actual factor of proportionality for daily composite unit samples (7 days, individual unit)	Each daily value within $\pm 20\%$ of the 7 - day average
4. Variation of actual factor of proportionality for daily composite unit samples (daily, all units within system)	$\pm 20\%$ of the average value
5. Precision of sample preparation	Ratio of variance ≤ 3.29
6. Calibration error for percent sulfur analysis, dry basis	≤ 10 percent val (hi, mid, low ranges), each NIST SRM
7. Precision of analysis for percent sulfur, dry basis	$\leq 0.05\%$ sulfur if sample contains $< 2.0\%$ sulfur. $\leq 0.1\%$ sulfur if sample contains $\geq 2.0\%$ sulfur.
8. Standardization, calorimeter water equivalent	Must comply with ASTM D2015-77(78), Section 6
9. Precision of analysis for BTU/lb., dry basis	≤ 50 BTU/lb.
10. Response time of system	≤ 168 hours
11. Operational period of system	≥ 168 hours
12. Relative accuracy of system lb. SO ₂ /10 ⁶ BTU results.	≤ 20 percent of mean value of reference method test results plus 95% confidence interval
13. Data acquisition system accuracy	computations correct

TABLE IX

"Stack" Flow Monitoring Performance Specifications

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>
Install.	Range (SCFM).....	0 to >= max. expected & (>=1.25 x highest std.)
	Data recorder resolution (% of lowest std.).....	1.0 maximum
	Data recorder resolution (minutes).....	5 maximum**
	Number of cycles per hour (meas. and record.).....	12 minimum**
	Schedule for zero and calibration checks.....	Daily minimum
	Procedures for zero and calibration checks.....	measurement simulation if possible otherwise signal simulation
	Schedule for checking pressure lines/detectors.....	Daily
	Schedule for back-purging/build-up checks.....	Daily
	Schedule for leak checks.....	Quarterly
	Simulated signal application point.....	close to signal generation point
Perform.	Relative accuracy (% of reference method)****.....	10.0 maximum*
	Calibration error (% of reference value).....	5.0 maximum*
	Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	6.0 maximum*
	Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	6.0 maximum*
	Response time (minutes to 95% response).....	5 maximum
	Orientation sensitivity where applicable..... (degrees for +4% or more flow inaccuracy).....	10 minimum
	Operational test period (hours without corrective maintenance).....	168 minimum
	Data acquisition system accuracy, 1 - hour avgs (% of lowest std).....	1 maximum***

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

**** Only required if data must be reported for compliance with a standard or operational criterion in units of flow.

TABLE X

Temperature Monitoring Specifications

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>
Install.	Range (Degrees F).....	0 to >= max. expected & (>=1.25 x highest std.)
	Data recorder resolution (% of lowest std).....	1.0 maximum
	Number of cycles per minute (measurement).....	60 minimum
	Number of cycles per minute (recording).....	1.0 minimum
	Schedule for zero and calibration checks.....	daily minimum***
	Procedures for zero and calibration checks.....	signal simulation***
	Simulated signal application point.....	close to signal generation point***
Perform.	Calibration error (% of reference temperature or emf).....	5.0 maximum+, ++
	Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	4.0 maximum*
	Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	5.0 maximum*
	Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	4.0 maximum*
	Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	5.0 maximum*
	Operational test period (hours without corrective maintenance).....	168 minimum
	Data acquisition system accuracy, 1 - minute avgs (% of lowest operational criterion).....	1 maximum**
	Data acquisition system accuracy, 1 - hour avgs (% of lowest operational criterion).....	1 maximum**

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

*** This requirement may be waived if quarterly recalibration is conducted in accordance with, or if the temperature measurement device is exempted from quarterly recalibration in accordance with, the procedures specified in the Quality Assurance section of this manual.

+ In accordance with the procedures specified in the Quality Assurance section of this manual, if temperature used as reference (5 repetitions at each of 3 levels), expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient for each level. If emf used as reference (single measurement every 200 degrees), expressed as the absolute value of the mean for each comparison.

++ This requirement may be waived if the temperature measurement device is exempted from quarterly recalibration in accordance with the procedures specified in the Quality Assurance section of this manual.

TABLE XI

Specifications for pollutants or parameters reported in terms of emission standards or operational criteria not listed elsewhere

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>
Install.	Range (terms of device measurement).....	0 to >= max. expected & (>=1.25 x highest std.)
	Data recorder resolution (% of lowest std).....	1.0 maximum
	Data recorder resolution (minutes).....	15 maximum**
	Number of cycles per hour (meas. and record.).....	4 minimum**
	Schedule for zero and calibration checks.....	daily minimum
	Procedures for zero and calibration checks.....	all system components checked
	Calibration gas ports.....	close to sample point
	Relative accuracy-in terms of standard**** either (% of reference method).....	20.0 maximum*
	or (% of lowest standard).....	10.0 maximum*
	or (units of standard in ppm).....	5.0 maximum**
or (units of standard in lbs/mm Btu).....	0.02 maximum**	
or (units of standard in %).....	2.0 maximum**	
or (units of standard in lbs/hr).....	1.0 maximum**	
Calibration error (% of actual concentration).....	5.0 maximum*	
or (abs ppm).....	5.0 maximum**	
Zero drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I)....	4.0 maximum*	
Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I)....	5.0 maximum*	
Calibration drift-2 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	4.0 maximum*	
Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	5.0 maximum*	
Response time (minutes to 95% response).....	15 maximum	
Operational test period (hours without corrective maintenance).....	168 minimum	
Data acquisition system accuracy, 1 - hour avgs (% of lowest std).....	1 maximum***	

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** For reference method averages of twice the specification or less, expressed as the absolute value of the mean, otherwise expressed as the mean of the absolute values.

*** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

**** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

***** Only required if data must be reported for compliance with a standard or operational criterion in terms of the pollutant.

TABLE XII

Specifications for parameters used as components of monitoring systems but not listed elsewhere, based on basic measurements of length, mass, time, temperature, current, luminous intensity or events, or derived from such basic measurements (for instance, volume rate, mass rate, velocity, force, pressure, torque, rpm, voltage, resistance, spark rate, etc.). For use only when specified or allowed by an applicable monitoring requirement, or when necessary to convert data to terms of the applicable standard or operational criterion.

<u>TYPE</u>	<u>PARAMETER</u>	<u>SPECIFICATION</u>
Install.	Range (terms of measurement).....	0 to >= max. expected & (>=1.25 x highest std.)
	Schedule for zero and calibration checks.....	daily minimum****
	Procedures for zero and calibration checks.....	measurement simulation if possible otherwise signal simulation****
	Calibration point.....	close to measurement point****
	Data recorder resolution (% of lowest std).....	1.0 maximum
	Data recorder resolution (minutes).....	1 maximum**
	Number of cycles per hour (meas. and record.).....	60 minimum**
Perform.	Calibration error (% of actual measurement or simulated signal).....	5.0 maximum*
	Zero drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	5.0 maximum*
	Calibration drift-24 hour (% of lowest monitored emission standard equivalent as determined during Phase I).....	5.0 maximum*
	Response time (minutes to 95% response).....	equal to recorder resolution
	Operational test period (hours without corrective maintenance).....	168 minimum
	Data acquisition system accuracy, 1 - hour avgs (% of lowest std).....	1 maximum***

* Expressed as the sum of the absolute value of the mean and the absolute value of the 95% confidence coefficient.

** Must meet most stringent requirements of other analyzers in CEMS (except temperature)

*** If data recording is digital, expressed as the absolute value of the mean. If data recording is analog, expressed as the absolute value of the mean and the absolute value of the 95% confidence coefficient.

**** This requirement may be waived if quarterly recalibration of the measurement device/readout device combination is conducted using NIST procedures, ASTM procedures, or other procedures approved by the Department each calendar quarter.

TABLE XIII

Specifications for Fuel Flowmeters.

<u>TYPE</u>	<u>SPECIFICATION</u>
Certification	Per 40 CFR, Part 75, Appendix D, Paragraph 2.1.5, "Initial Certification Requirement for all Fuel Flowmeters" and all subparagraphs
Quality Assurance	Per 40 CFR, Part 75, Appendix D, Paragraph 2.1.6, "Quality Assurance" and all subparagraphs

NOTE: Flowmeters used in "Situations in Which Certified Flowmeter is Not Required", per 40 CFR, Part 75, Appendix D, Paragraph 2.1.4 and all subparagraphs are exempt from these requirements.

PERFORMANCE TESTING (PHASE II)

After approval of Phase I, the applicant should proceed with purchasing, installation, and performance testing. The CEM Section must be advised in writing at least 45 days prior to Performance Specification Testing and provided the opportunity to observe and participate in all testing. A testing protocol, describing all testing procedures and methodology to be used must accompany the notice of testing. Schedule changes must be reported seven days prior to testing except that failed tests may be repeated immediately. During testing, the source must be operated in a manner that is representative of normal operating conditions.

The CEM Section must also be advised in writing within 10 days after the completion of testing. If electronic certification CEMS and analyzer test completion data record formats are specified in Attachment No. 3 to this Manual, such records must also be submitted. The CEM Section reserves the right to conduct testing during the Performance Specification Testing or at any time thereafter.

For new sources, Phase II must be completed within 210 days of startup and within 60 days of achieving normal process capacity. All performance specification testing must be conducted in accordance with the appropriate performance specification test procedures in this manual. Note that the entire CEMS, including all data handling, record keeping and reporting systems/procedures must be operational prior to testing. Upon approval of new CEMSs, data will be required to be reported beginning with data collected the day following completion of testing. Upon request, the Bureau will consider a petition to accept data from the new CEMS starting from the time the CEMS was installed, adjusted and calibrated, provided no corrective maintenance was performed in the interim.

For testing required due to changes made to previously approved CEMSs, data collected from the CEMS from the time changes were instituted through completion of changes including any necessary adjustment and calibration should be identified as invalid due to "Corrective Maintenance (20)". Reports for all such affected parameters, beginning with reports for the quarter in which the changes were instituted, should be retained at the facility and reported upon receipt of Department approval of the affected monitoring systems.

I. Continuous Gas Monitoring Systems

- A. Conduct tests of each measurement device, except for fuel flowmeters for response time, 2-hour and 24-hour zero and calibration drift and calibration error in accordance with the procedures in Attachment No. 2. Fuel flowmeters must meet the certification requirements listed in Table XIII of this Manual.
- B. Conduct the test for relative accuracy of the overall system results in accordance with the procedures in Attachment No. 2. Additional requirements are:
1. Data from the monitoring system must be converted to units consistent with the applicable emission standard.
 2. Relative accuracy testing must be conducted in accordance with the procedures specified in the Department's Source Testing Manual. All emission points serving the source combination to which the emission standard or operational criterion applies must be sampled simultaneously, unless an alternative strategy is approved by the Department. Interference checks, where required, are to be conducted using gas concentrations near or above concentrations expected in the stack gases. Each relative accuracy test run must be at least 21 minutes in duration. The duration must be a multiple of the actual cycle times of all measurement devices.
 3. For each of at least nine reference method tests for relative accuracy (if more than nine tests are conducted, the results from additional tests, up to a maximum of three tests may be eliminated from determination of relative accuracy), the following must also be determined (if necessary to convert data to units of the applicable emission standard or operational criterion):
 - a. Volumetric flow rate according to the procedures specified in the Department's Source Testing Manual.
 - b. For combustion units, the heat input to the unit using heat balance or actual fuel feed data.
 4. For all tests, results must be reported in units consistent with the applicable emission standard or operational criterion. Where applicable, emissions in lbs./10⁶ BTU must be calculated using either - 1) the data collected in 3 above, or 2) diluent measurement and the appropriate F-factor as determined in paragraph 5 below.
 5. For combustion units, the F-factor for the fuel must be verified (if necessary to convert data to units of the applicable emission standard or operational criterion) by analyzing a composite sample using the procedure specified in 40 CFR, Part 60, Subpart D, Section 60.45(f)(5). For periodic self-audits, if a source: (1) burns a 'uniform' fuel (anthracite coal, bituminous coal, a single grade of fuel oil, natural gas, etc.), (2) does not blend fuels, and (3) uses the 'published' F-factor for the fuel in both the CEMS data handling system and the source testing calculations, the F-factor 'reverification' may be waived.
 6. For existing, previously approved monitoring systems, results from any "aborted" relative accuracy test runs or attempts or from "diagnostic" activities that lead to corrective actions must be reported.
- C. Document the system status with respect to the operational test period specification. If corrective maintenance is performed on the system, demonstration of compliance with the operational test period specification must be repeated.
- D. Document the accuracy of computations performed by the data acquisition system by comparing the results of "manual calculation" (using a calculator or independent, manually operated computer system) of nine hourly averages (using values from the CEMS data recorders and the same equations, constants and

variables used by the data acquisition system) with the hourly averages calculated by the data acquisition system.

II. Opacity Monitoring Systems

- A. Conduct tests for response time, 24-hour zero and calibration drift, calibration error, averaging period calculation and recording, and optical alignment in accordance with the procedures in Attachment No. 1.
- B. Opacity monitoring system data must be verified by a trained observer in accordance with the Opacity Monitoring Relative Accuracy Test Procedure as follows:
 1. Visual opacity readings, obtained in accordance with the procedures specified in 40 CFR 60, Appendix A, Method 9, must be recorded for nine 15-minute time periods conducted at any time during the 168-hour operational test period. The results for each 15-minute time period must be reduced to 15 one-minute averages.
 2. The opacity monitoring system output for each of the time periods corresponding to those used for the visual observations, as conducted in (1) above, must be reduced to 15 one-minute averages.
 3. For each of the corresponding visual and system one-minute averages, the absolute value of the difference in percent opacity must be determined.
 4. The results of the verification will be considered acceptable if, for each of the nine 15-minute tests:
 - a. None of the individual differences, as calculated in (3) above, exceeds 15 percent opacity.
 - b. The average of the 15 differences does not exceed 7.5 percent opacity.
 5. For existing, previously approved monitoring systems, results from any "aborted" relative accuracy test runs or attempts or from "diagnostic" activities that lead to corrective actions must be reported.
- C. Document the system status with respect to the operational test period specification. If corrective maintenance is performed on the system, demonstration of compliance with the operational test period specification must be repeated.
- D. Document the accuracy of computations performed by the data acquisition system by comparing the results of "manual calculation" (using a calculator or independent, manually operated computer system) of nine hourly averages (using values from the CEMS data recorders and the same equations, constants and variables used by the data acquisition system) with the hourly averages calculated for the same time periods by the data acquisition system. In addition, compare the results of manual calculation of 60 one-minute averages (using values from the CEMS data recorders and the same equations, constants and variables used by the data acquisition system) with the one-minute averages calculated for the same time periods by the data acquisition system.

III. Coal Sampling/Analysis Systems

A. Conditioning Period

1. Determine the calorimeter water equivalent in accordance with ASTM D2015-77(78), Section 6. Record all data and results for submission with performance test report.
2. Operate the system for an initial 168-hour conditioning period in a normal operating manner.

B. Operational test period. Operate the system for an additional 168-hour period in a normal operating manner during which time all performance testing must be completed (with the exception of Sections B.5. through B.9. below, which must be completed within 168 hours after the completion of the operational test period).

1. Test for number of subincrement point samples per hour. Conduct this test in triplicate for each point of sample acquisition.
 - a. Collect and weigh a single subincrement point sample.
 - b. Collect and weigh the next subsequent hourly increment point sample.
2. Test for weight of hourly increment point samples. Conduct this test in triplicate for each point of sample acquisition.
 - a. Use the weights determined in B.1.b. above for this test.
3. Test for variation of actual factor of proportionality for daily composite unit samples (7 days, individual unit).
 - a. For each unit monitored, collect all data necessary to determine the actual factor of proportionality (F_{ia}) for each of the seven daily time periods during the operational test period (i.e., the weight of each daily composite unit sample and the weight of coal burned in the unit during the same daily time period).
4. Test for variation of actual factor of proportionality for daily composite unit samples (daily, all units within system).
 - a. Use the data collected as in B.3.a. above for this test.
5. Test for precision of sample preparation. Conduct this test for each system monitored using any five of the seven daily composite system samples normally collected during the 168-hour operational test period.
 - a. Divide the daily composite system sample into two equal subsamples.
 - b. Prepare and analyze one of the subsamples according to normal procedures (in duplicate).
 - c. Prepare and analyze the remaining subsample for dry ash content using ASTM D2013-72(78), Appendix A2, Section A2.2.
6. Test for calibration error of percent sulfur analysis, dry basis.
 - a. For each measurement device to be used, conduct five non-consecutive analyses on each of an NIST SRM low, middle, and high range for percent sulfur, dry basis at any time during the 168-hour operational test period.
7. Test for precision of analysis for percent sulfur, dry basis.
 - a. Conduct the normal duplicate analyses of the daily composite system samples for the 168-hour operational test period.
8. Test for precision of analysis for BTU/lb., dry basis.

- a. Conduct the normal duplicate analyses of the daily composite system samples for the 168-hour operational test period.
9. Test for response time of monitoring system.
- a. Record the date and time that each calculation of lbs. SO₂/10⁶ BTU is completed for each daily composite system sample during the 168-hour operational test period.
10. Test for standardization of calorimeter water equivalent.
- a. Use data and results as obtained in A.1. above.
11. Test for operational period of monitoring system.
- a. Keep records indicating compliance with all performance specifications for the 168-hour operational test period.
12. Test for relative accuracy of monitoring system lbs. SO₂/10⁶ BTU results. This test must be conducted for each system monitored.
- a. Conduct a series of at least nine source tests for SO₂ emissions in accordance with the procedures listed in the Department's Source Testing Manual. (if more than nine tests are conducted, the results from additional tests, up to a maximum of three tests may be eliminated from determination of relative accuracy). Each test must be conducted for a duration of between 30 and 60 minutes and must consist of the following determinations:
 - i. Effluent SO₂ concentration in accordance with the procedures specified in Chapter 139, Section 139.4(10).
 - ii. Effluent volumetric flow rate according to Methods 1, 2, 3 and 4 of 40 CFR, Part 60, Appendix A of the Code of Federal Regulations.
 - iii. Heat input to the source(s) being monitored, using heat balance or actual fuel feed data.
 - b. Results of each source test must be expressed as lbs. SO₂/10⁶ BTU for a known, discrete hourly time period, using the data collected in i above and either - 1) the data collected in ii and iii above, or 2) diluent measurement and the appropriate F-factor.
 - c. Collect and analyze, in the normal manner, hourly increment system samples for the system monitored for time periods corresponding to each source test.
 - d. Results of the monitoring system must be expressed as lbs. SO₂/10⁶ BTU for the time periods corresponding to each source test.
13. For existing, previously approved monitoring systems, results from any "aborted" relative accuracy test runs or attempts or from "diagnostic" activities that lead to corrective actions must be reported.

C. Calculations

- 1. Number of subincrement point samples per hour.
 - a. Using the data collected as in B.1.a and B.1.b., calculate the average number of subincrement point samples as follows:

$$\bar{N} = \frac{\bar{X}_i}{\bar{X}_{si}}$$

where \bar{N} = average number of subincrement point samples per hour

\bar{X}_i = average of the three weights determined as in B.1.b.

\bar{X}_{si} = average of the three weights determined as in B.1.a.

2. Weight of hourly increment point samples

a. Using the data collected as in B.1.b., calculate the average weight of hourly increment point samples as follows:

$$\bar{X}_i = \frac{\sum_{i=1}^3 X_i}{3}$$

where \bar{X}_i = average weight of hourly increment point samples

X_i = individual weights determined as in B.1.b.

3. Variation of actual factor of proportionality for daily composite unit samples (seven day, individual unit).

a. Calculate the actual factor of proportionality for each daily composite unit sample for each daily time period as follows:

$$F_{ia} = \frac{X_i}{C'_{ia}}$$

where F_{ia} = actual factor of proportionality for daily composite unit sample

X_i = weight of daily composite unit sample

C'_{ia} = weight of coal burned in unit during the corresponding daily time period

b. Calculate the average of the actual factors of proportionality for the 168-hour operational test period as follows:

$$\bar{F}_{ia} = \frac{\sum_{i=1}^7 F_{ia}}{7}$$

where \bar{F}_{ia} = average of the actual factors of proportionality for the 168-hour operational test period

F_{ia} = individual actual factors of proportionality for each daily composite unit sample

c. Calculate the variation as follows for each of the 7 actual factors of proportionality:

$$V_i = \frac{F_{ia}}{F_{ia}}$$

where V_i = variation of an individual actual factor of proportionality

F_{ia} = individual actual factor of proportionality

\bar{F}_{ia} = average of the actual factors of proportionality as calculated in C.3.b.

4. Variation of actual factors of proportionality for daily composite unit samples (daily, all units within system)

a. Calculate the average of the actual factors of proportionality for all units within a system, for each daily time period during the 168-hour operational test period as follows:

$$\bar{F}_{sa} = \frac{\sum_{i=1}^n F_{ia}}{n}$$

where \bar{F}_{sa} = average of the actual factors of proportionality for all units within a system for a particular daily time period during the 168-hour operational test period.

F_{ia} = individual actual factor of proportionality

n = number of units within system

b. Calculate the variation as follows for each of the units for each of the seven daily time periods during the operational test period:

$$V_i = \frac{F_{ia}}{\bar{F}_{sa}}$$

where V_i = variation of an individual actual factor of proportionality

F_{ia} = individual actual factor of proportionality

\bar{F}_{sa} = average of the actual factors of proportionality for all units within a system for a particular daily time period as calculated in C.4.a.

5. Precision of sample preparation

a. Using the data collected in B.5.c., calculate the ratio of the largest variance of any set of four subsamples to the average variance of the five sets of four subsamples according to ASTM D2013-72(78), Appendix A2.

b. The ratio calculated in C.5.a. must be ≤ 3.29 in order to comply with Performance Specification 5.

6. Calibration error of percent sulfur analysis, dry basis

a. Using the data collected in B.6.a., calculate each error as follows:

$$E_i = \left| \frac{\%S_{mi}}{\%S_{ci}} * 100\% \right| - 100\%$$

where E_i = error of an individual analysis
%S_mi = measured percent sulfur, dry basis
%S_ci = certified percent sulfur, dry basis

7. Precision of analysis for percent sulfur, dry basis

a. Using the data collected as in B.7.a., calculate the precision of analysis for percent sulfur, dry basis for each pair of duplicate analyses as follows:

$$P_i = | \%S1_i - \%S2_i |$$

where P_i = precision of analysis for an individual pair of duplicate analyses

%S₁_i = percent sulfur results for first analysis

%S₂_i = percent sulfur results for second (duplicate) analysis

8. Precision of analysis for BTU/lb., dry basis

a. Using the data collected in B.8.a., calculate the precision of analysis for BTU/lb., dry basis for each pair of duplicate analyses as follows:

$$P_i = | H1_i - H2_i |$$

where P_i = precision of analysis for an individual pair of duplicate analyses

H₁_i = BTU/lb. results for first analysis

H₂_i = BTU/lb. results for second (duplicate) analysis

9. Response time of monitoring system.

a. Using the data collected as in B.9.a., calculate the time between recording of lbs. SO₂/10⁶ BTU results and the end of the daily time period represented by the results.

10. Standardization of calorimeter water equivalent

a. Using the data collected in A.1., calculate the standard deviation of the test series in accordance with ASTM D2015-77(78), Appendix A1. This value must be \leq 3.6 BTU/degree F in order to comply with Performance Specification 8.

11. Operational period of monitoring system.

a. If the monitoring system fails to comply with any performance specification during the 168-hour operational test period, the test period must be repeated. During the repetition, compliance need be demonstrated only with the failed specification(s).

12. Relative accuracy of monitoring system lbs. SO₂/10⁶ BTU results. Using the data collected as in B.12.a. through B.12.d., calculate the relative accuracy plus 95 percent confidence interval as follows:

$$A_r = \left| \frac{[(\sum_{i=1}^9 (X_{si} - X_{mi})) + CI_{0.95}]}{\sum_{i=1}^9 X_{si}} \right| * 100\%$$

$$CI_{0.95} = 0.09 \sqrt{9[\sum_{i=1}^9 (X_{si} - X_{mi})^2] - [\sum_{i=1}^9 (X_{si} - X_{mi})]^2}$$

where Ar = relative accuracy plus 95 percent confidence interval

X_{si} = lbs. SO₂/10⁶ BTU source test results

X_{mi} = lbs. SO₂/10⁶ BTU monitoring system results

IV. "Stack" Flow and Temperature Monitoring Systems

A. "Stack" flow Monitoring Systems. If negative drift of at least 5% of range cannot be determined normally, the recorder must be offset so as to allow for such determination.

1. Conduct tests for 2-hour and 24-hour zero and calibration drift and calibration error.
2. Relative Accuracy. Conduct at least nine volumetric flow rate determinations at each of three different velocities (low mid and high) simultaneously using the reference method as listed in the Department's Source Testing Manual and the continuous flow monitoring system (if more than nine tests are conducted, the results from additional tests, up to a maximum of three tests may be eliminated from determination of relative accuracy). The reference method traverse location may be any location acceptable for volumetric flow rate determination in accordance with the Source Testing Manual.
3. Zero Drift and Calibration Drift. At 24-hour intervals, or more frequently if recommended by the manufacturer, subject the continuous flow monitoring system to the manufacturer's specified zero and calibration procedures, if appropriate. Record the continuous flow monitoring system output readings before and after any adjustments.
4. Response Time. Make five determinations of both upscale and downscale response time by measuring the time to 95% response from the normal on-line reading of the continuous flow monitoring system to the zero or calibration points, as appropriate.
5. Orientation Sensitivity (where applicable as determined by the Department). Rotate the measurement device 10° on each side of the direction of flow in increments of 5°. Record the continuous flow monitoring system output at the 0°, 5°, and 10° increments. Conduct the test three times each at low, mid and high velocities.
6. Operational Test Period. Document that for at least 168 continuous hours, the system required no corrective maintenance.
7. Document the accuracy of computations performed by the data acquisition system by comparing the results of manual calculation of nine hourly averages (using values from the CEMS data recorders and the same equations, constants and variables used by the data acquisition system) with the hourly averages calculated for the same time periods by the data acquisition system. .

B. Temperature Monitoring Systems. If negative drift of at least 5% of range cannot be determined normally, the recorder must be offset so as to allow for such determination.

1. Conduct tests for 2-hour and 24-hour zero and calibration drift and calibration error.
2. Zero Drift and Calibration Drift. At 24-hour intervals, or more frequently if recommended by the manufacturer, subject the system to zero and calibration procedures. Record the monitoring system output readings before and after any adjustments.
3. Response Time. Make five determinations of both upscale and downscale response time by measuring the time to 95% response from the normal on-line reading of the monitoring system to the zero or calibration points, as appropriate.
4. Operational Test Period. Document that for at least 168 continuous hours, the system required no corrective maintenance.
5. Document the accuracy of computations performed by the data acquisition system by comparing the results of "manual calculation" (using a calculator or

independent, manually operated computer system) of nine hourly averages (using values from the CEMS data recorders and the same equations, constants and variables used by the data acquisition system) with the hourly averages calculated for the same time periods by the data acquisition system. In addition, compare the results of manual calculation of 60 one-minute averages (using values from the CEMS data recorders and the same equations, constants and variables used by the data acquisition system) with the one-minute averages calculated for the same time periods by the data acquisition system.

FINAL APPROVAL (PHASE III)

A report must be submitted to the Bureau verifying the monitoring system's compliance with all regulatory requirements. The report must be submitted within two months after completion of Phase II and must include identification of all analyzer/measurement device serial numbers, all raw data and calculations for testing as specified in Phase II and data as specified in the following:

I. Continuous Source Emission Monitoring

- A. For opacity monitoring, Paragraph 8.0, including subparagraphs, of Attachment No. 1.
- B. For gas monitoring, The "Reporting" section of Attachment No. 2. For drift calculations, use the "equivalent reading at the level of the lowest monitored emission standard" for the measurement device (as determined during Phase I) as the "reference value".

II. "Stack" Flow and Temperature Monitoring

- A. For each relative accuracy test ("stack" flow), the sum of 1) the absolute value of the average of the differences of the paired relative accuracy readings and 2) the 95% confidence coefficient. Divide this sum by the mean reference value or by the value of the applicable emission standard or operational criterion and report the results as a percentage. Also, as appropriate, report the average of the absolute values of the differences of the paired relative accuracy readings. Include all raw data and calculations.
- B. For each of the three calibration error levels (two if zero is used as the first level) the sum of 1) the average of the differences of the nine paired reference and measurement device readings and 2) the 95% confidence coefficient. Divide this sum by the reference value and report the results as a percentage. Include all raw data and calculations.
- C. The sum of the absolute values of the differences between successive zero readings and the 95% confidence coefficient. Divide this sum by the lowest emissions standard equivalent value, as determined during Phase I, and report the results as a percentage. Include all raw data and calculations.
- D. The sum of the absolute values of the differences between successive calibration readings and the 95% confidence coefficient. Divide this sum by the lowest emissions standard equivalent value, as determined during Phase I, and report the result as a percentage. Include all raw data and calculations.
- E. All raw data and calculations for response time.
- F. Documentation of no corrective maintenance for at least 168 continuous hours.

The method used to convert the monitoring data to the required reporting format must be verified in the report using actual test data. The report must also include a description of any changes, additions, or deletions made to the information submitted in the initial application (Phase I).

If electronic certification record formats are specified in Attachment No. 3 to this Manual, such records must also be submitted.

Samples of all applicable electronic data report records, as specified in Attachment No. 3, must be submitted with the report.

RECORD KEEPING AND REPORTING

NOTE: All reporting is to be on an Eastern Standard Time basis.

NOTE: The data acquisition system must be capable of reading all values over the full range of each measurement device and must create a permanent record of all required raw and calculated data for storage, review and reporting. In addition a continuous readout in units of each applicable emission standard or operating criteria is required.

NOTE: A cover letter shall accompany all reports and shall include:

1. The statement:

"I am authorized to make this submission on behalf of the owners and operators of the affected facility or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment."

"I understand that DEP may reject any electronic data submission if it does not conform to the formatting requirements specified by DEP."

"To the extent that information has been submitted in electronic format, I acknowledge that DEP will rely solely on electronic information as accurate and complete information. I certify that the data provided in electronic format with this submission contains correct and current data and is consistent with all current hardcopy information."

2. The signature of the person exercising managerial responsibility over the operation of the source(s) for which monitoring is required or of the designated representative pursuant to 40 CFR 75.

I. Continuous Source Emission Monitoring Systems

A. Record Keeping

1. The company shall reduce all of the monitoring system results to one-hour averages on a clock basis in units consistent with the applicable emission standard(s). The method(s) must be in accordance with the data validation and reduction criteria in the Quality Assurance section of this manual.

2. The company shall reduce all of the monitoring system results for opacity and temperature to one-minute averages on a clock basis in accordance with the data validation and reduction criteria in the Quality Assurance section of this manual.

3. A chronological file shall be maintained by the company that includes:

a. All measurements from the monitoring system on at least the minimum data recording frequency (chart recordings of the proper resolution are acceptable).

b. All valid averages as specified above.

c. The cause, time periods, and magnitude of all emissions that exceed the applicable emission standard(s).

d. Data and results for all tests, audits and recalibrations.

- e. A record of any repairs, adjustments, or maintenance to the monitoring system.
 - f. The data necessary for conversion of the monitoring system data to units consistent with the applicable emission standard or operational criterion, including the values for any manually-adjustable "K-factors" or other "constants".
 - g. The cause and time periods for any invalid data averages.
 - h. The process and pollution control equipment operating data for all parameters which have a significant affect the levels of the emissions or operational criterion being monitored.
 - i. Copies of the Phase I application, Phase II testing protocol, Phase III performance specification testing report and all correspondence related thereto.
 - j. Records of all corrective actions taken in response to exceedances of emission standards, operational criteria or data availability standards.
4. All data must be maintained by the company for a period of five years (either on-line or off-line) and be provided to the Department upon request at any time.

B. Reporting Requirements

1. The following information shall be reported to the Department on a calendar quarter basis:
 - a. Information in accordance with the appropriate electronic data report record formats in Attachment No. 3 of this manual or as specified by the Department.
 - b. The results from all tests, audits and recalibrations conducted during the quarter.
2. The report shall be submitted to the central office by the 30th day following the close of the reporting period.
3. The report shall be submitted in a format specified by the Department and must be signed by the person exercising managerial responsibility over the operation of the source(s) for which monitoring is required or by the designated representative pursuant to 40 CFR 75.
4. Data for monitoring systems installed on municipal waste incinerators shall be made available in accordance with the Interim Data Telemetry Protocol in Attachment No. 4 of this manual.

II. Coal Sampling/Analysis Systems

A. Record Keeping

1. The company shall reduce all of the system results to daily averages in lbs SO₂/10⁶ BTU in accordance with the data validation and reduction criteria in the Quality Assurance section of this manual.
2. A chronological file shall be maintained by the company that includes:
 - a. All laboratory samples identified by system and date represented.
 - b. The results of each analysis for percent sulfur and BTU/lb.
 - c. All valid averages as calculated in 1. above, along with the date and time the result was recorded.
 - d. The cause, time periods, and magnitude of all calculated emissions which exceed the applicable emission standard(s).
 - e. Data and results for all CSAS performance tests and recalibrations.
 - f. The data necessary to show compliance with all data validation and reduction criteria in the Quality Assurance section of this manual.
 - g. The cause and time periods for any invalid data averages.
 - h. A record of any repairs, adjustments, or maintenance to the system.
 - i. The process and pollution control equipment operating data for all parameters which affect the emission level of SO₂.
 - j. Copies of the Phase I application, Phase II testing protocol, Phase III performance specification testing report and all correspondence related thereto.
 - k. Records of all corrective actions taken in response to exceedances of emission standards, operational criteria or data availability standards.
3. All data must be maintained by the company for a period of five years (either on-line or off-line) and be provided to the Department upon request at any time. Laboratory samples must be maintained until the end of the next subsequent reporting period.

B. Reporting Requirements

1. The following information shall be reported to the Department on a calendar quarter basis:
 - a. Information in accordance with the appropriate electronic data report record formats in Attachment No. 3 of this manual or as specified by the Department. For reporting formats requiring hourly averages, report the daily average value for each of the valid data hours, reporting the appropriate information for the invalid data hours.
 - b. For each day, the number of valid hours and causes for any invalid daily averages.
 - c. The results from all CSAS performance tests and recalibrations conducted during the quarter.
2. The report shall be submitted to the central office by the 30th day following the close of the reporting period.

3. The report shall be submitted in a format specified by the Department and must be signed by the person exercising managerial responsibility over the operation of the source(s) for which monitoring is required or by the designated representative pursuant to 40 CFR 75.

III. "Stack" Flow and Temperature Monitoring Systems

A. Record Keeping

1. The company shall reduce all of the monitoring system results to 1-hour averages on a clock basis in accordance with the data validation and reduction criteria in the Quality Assurance section of this manual.
2. The company shall reduce all of the monitoring system results for temperature to 1-minute averages on a clock basis in accordance with the data validation and reduction criteria in the Quality Assurance section of this manual.
3. A chronological file shall be maintained by the company which includes:
 - a. All measurements from the monitoring system on at least the minimum data recording frequency (chart recordings are acceptable).
 - b. All valid averages as required above.
 - c. Data and results for all performance tests and recalibrations.
 - d. A record of any repairs, adjustments or maintenance to the monitoring system.
 - e. The cause and time periods for any invalid data averages.
 - f. The data necessary for conversion of the monitoring system data to units consistent with the applicable emission standard or operational criterion, including the values for any manually-adjustable "K-factors" or other "constants".
 - g. The process and pollution control equipment operating data which affects the parameters being monitored.
 - h. Copies of the Phase I application, Phase II testing protocol, Phase III performance specification testing report and all correspondence related thereto.
 - i. Records of all corrective actions taken in response to exceedances of emission standards, operational criteria or data availability standards.
4. All data must be maintained by the company for a period of five years (either on-line or off-line) and be provided to the Department upon request at any time.

B. Reporting Requirements

1. The following information shall be reported to the Department on a calendar quarter basis:
 - a. Information in accordance with the appropriate standard electronic data report record formats in Attachment No. 3 of this manual or as specified by the Department.
 - b. The results from all performance tests, audits and recalibrations conducted during the quarter.
2. The report shall be submitted to the central office by the 30th day following the close of the reporting period.
3. The report shall be submitted in a format specified by the Department and must be signed by the person exercising managerial responsibility over the operation of the source(s) for which monitoring is required or by the designated representative pursuant to 40 CFR 75 .

4. Data for monitoring systems installed on municipal waste incinerators shall be made available in accordance with the Interim Data Telemetry Protocol in Attachment No. 4 of this manual.

QUALITY ASSURANCE

NOTE 1: The step-by-step quality assurance plan, submitted as part of the Phase I initial application, must be reviewed annually. If revised, the revised QA plan must be submitted with the report of required annual quality assurance activities (the submitter may refer to a quality assurance plan submitted with a previously approved Phase I application and submit only the revised information). Quality assurance plans for monitoring systems approved prior to the effective date of this manual revision must be submitted with the first report of required annual quality assurance activities conducted after such effective date.

NOTE 2: (Extended outage/shutdown) If a monitored source has been out of operation or production for an entire calendar quarter, or if a monitored source is expected to be out of operation or production for at least one calendar quarter, the Bureau must be notified of the estimated source downtime. During such time (source not operating at all during a calendar quarter), quarterly emission reports must continue to be submitted, with hourly data during process downtime entered as "III13.08" (or "0000.13" if the reports are subject to data substitution requirements). Quarterly and annual quality assurance activities must continue to be conducted during such time in accordance with the requirements listed below, except that calibration error testing must be conducted at least once every four calendar quarters (may be conducted with source not operating), and relative accuracy testing must be conducted at least once every eight calendar quarters (must be conducted while source is operating). Failure to submit the required quarterly emission reports or to conduct the required quarterly and annual quality assurance activities will result in rescinding the Department's approval of the affected monitoring systems in accordance with 25 PA Code, Chapter 139, Section 139.101(9). In order to request approval of the affected monitoring systems after such rescission, a new Phase I monitoring plan must be submitted in accordance with all then-applicable requirements.

NOTE 3: Records of any manual adjustments performed in conjunction with either 1) a zero or calibration check, 2) quarterly calibration error check, 3) periodic self-audit or 4) as a result of other checks, tests or observations must be maintained in accordance with the requirements of the Record Keeping And Reporting section of this manual.

I. Continuous Source Emission Monitoring Systems

A. Data Validation Criteria

1. Data must be considered invalid if any of the following conditions occur:

- a. The monitoring system is not operated in accordance with the performance specifications in this manual.
- b. The monitoring system is not operated in accordance with the quality assurance criteria in the approved initial application (Phase I) or in this manual.
- c. Any portion of the monitoring system is inoperative.
- d. A calibration or zero drift for any measurement device exceeds twice the applicable calibration drift performance specification (applied to a single reading with no confidence coefficient) as indicated in this manual. Data is considered invalid until the next acceptable calibration.
- e. Calibration or zero drift check for a measurement device is not conducted during a calendar day. Data for any subsequent calendar days during which the source is operated is considered invalid until a successful drift check is initiated.
- f. The monitored process is not operating and/or not emitting the pollutant being monitored.

- g. The required quarterly calibration error check for any measurement device exceeds the applicable performance standard. Data collected in the range failed (low, mid or high) is considered invalid until the next acceptable calibration error check, except that if the initial quarterly calibration error check for any replacement measurement device exceeds the applicable performance standard, data collected in the range failed (low, mid or high) is also considered invalid back to the time of such replacement. Range of invalidated data must be from 0 to midway between the actual low and mid range calibration values for failure at the low level (when low level calibration error results reporting is required), from midway between the actual low and mid range calibration values to midway between the actual mid and high range calibration values for failure at the mid level (or 0 to midway between the actual mid and high range calibration values when low level calibration error results reporting is not required), and from midway between the actual mid and high range calibration values to the full scale reading of the measurement device for failure at the high level.
 - h. The required calibration error check is not conducted in accordance with the "quarterly calibration error check" requirements below. Data for subsequent quarters is considered invalid until a successful calibration error check is initiated.
 - i. For measurement devices used in accordance with Table XII of this manual and not undergoing daily calibration nor quarterly calibration error checks, if the quarterly calibration, conducted in accordance with NIST procedures, ASTM procedures, or other procedures approved by the Department, shows error in excess of the calibration error performance specification. Data is considered invalid for the entire time the measurement/readout device combination was used prior to the calibration and subsequent to a previously conducted successful calibration.
 - j. The system fails a periodic self-audit. Data is considered invalid from the time results of the failed test are received by the company or two months following completion of the test, whichever is earlier, until the commencement of the next acceptable relative accuracy test.
 - k. A periodic self-audit is not conducted in accordance with the provisions of either E or F, below (as applicable). Subsequent data is considered invalid until a successful periodic self-audit is initiated.
- B. Data Reduction Criteria. The following data reduction criteria apply unless other criteria are stipulated in Title 25 of the Pennsylvania Code, in a plan approval or permit condition or in an order issued by the Department. (Note: for multipoint sampling systems serving a single source, the total number of readings from all points are considered when determining percentages of valid readings)
- 1. All data averages must be calculated using valid data only.
 - 2. A one-minute average will be considered valid if it contains at least 75 percent valid data readings.
 - 3. A six-minute average will be considered valid if it contains at least 75 percent valid data readings.
 - 4. An hourly average will be considered valid if it contains at least 75 percent valid data readings.
 - 5. A three-hour average will be considered valid if it contains at least 2 valid hourly averages.
 - 6. A four-hour average will be considered valid if it contains at least 3 valid hourly averages.

7. A six-hour average will be considered valid if it contains at least 4 valid hourly averages.
8. An eight-hour average will be considered valid if it contains at least 6 valid hourly averages.
9. A twelve-hour average will be considered valid if it contains at least 9 valid hourly averages.
10. A daily average will be considered valid if it contains at least 18 valid hourly averages at any time during that daily time period.
11. A four-day average will be considered valid if it contains at least 3 valid daily averages.
12. A 30-day average will be considered valid if it contains at least 23 valid daily averages and at least 360 valid hourly averages.

C. Component Addition, Maintenance or Replacement

1. Maintenance

- a. Zero and calibration drift checks should be conducted immediately prior to any maintenance, if possible.
- b. Zero and calibration drift checks must be conducted immediately following any maintenance.
- c. If the post-maintenance zero or calibration drift checks show drift in excess of twice the applicable performance specifications, recalibration must be conducted in accordance with the quarterly calibration error check procedures in D.2. below. Measurement devices may be calibrated in-situ.

2. Addition or Replacement

- a. Scheduled addition of or replacement of components or software programs with components or software programs of different makes or models requires submittal of the record of proposed maintenance prior to such change. For unscheduled addition of or replacement of components or software programs with components or software programs of different makes or models, submittal of the record of conducted maintenance must be made as soon as possible after such replacement. Successful completion of performance testing may be required prior to use of data from the monitoring system. Contact the Department for specific instructions.
- b. Addition of or replacement of components or software programs with like makes and models may require successful completion of performance testing prior to use of data from the monitoring system. Contact the Department for specific instructions.

D. Periodic calibration (cylinder gas requirements appear in paragraph G below)

1. Daily calibration

- a. Calibration must be conducted at least daily for determination of measurement device zero and calibration drift on all measurement device ranges, except for fuel flowmeters. Fuel flowmeters must meet the quality assurance requirements specified in Table XIII of this Manual. The results of daily calibrations are calculated as the measurement device reading minus the value of the reference material used.
- b. For measurement devices that use calibration gas, the gas must be introduced as close to the point of sample acquisition as possible. For other devices, simulated signals must be applied as close to the point of signal generation as possible.

- c. The monitoring system must be adjusted whenever the zero or calibration drift performance specifications are exceeded.
- d. The zero drift check must be conducted at a measurement level at or between 0% and 30% of measurement device range, except for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual). The value selected must be lower than the lowest value that would be expected to occur under normal source operating conditions.
- e. The calibration drift check must be conducted at a measurement level at or between 40% and 100% of measurement device range, except for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual). An alternative level may be used, provided it can be demonstrated to better represent normal source operating levels.
- f. Zero and calibration drift check measurement values for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual), shall be in accordance with the requirements of ASTM D6216-98.

2. Quarterly calibration error check

- a. Conduct the test for calibration error on each range of each measurement device, except for fuel flowmeters, in accordance with the proper procedures in Attachment No. 2 (gases) or Attachment No. 1 (opacity), or with previously approved procedures at least once during each calendar quarter in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), except that if four consecutive calendar quarters elapse after the last calibration error testing was performed, the test for calibration error must be performed within 168 source operating hours. Fuel flowmeters must meet the Quality assurance requirements specified in TABLE XIII of this Manual.
- b. The high-level measurement values, except those used for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual), must be at or between 80% and 100% of measurement device range unless an alternative concentration can be demonstrated to better correspond to the level of the applicable emission standard or operational criterion. Alternatively, a high-level value may be used that is higher than the highest measurement device reading that occurred since the last calibration error check.
- c. The mid-level measurement values, except those used for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual), must be at or between 40% and 60% of measurement device range unless an alternative value can be demonstrated to better represent normal source operating levels.
- d. The low-level measurement values, except those used for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual), must be at or between 0% and 30% of measurement device range. The value selected must be lower than the lowest value that would be expected to occur under normal source operation conditions. Zero gases for devices measuring SO₂ or NO_x must be certified by the gas vendor to not contain concentrations of SO₂ or NO_x, as appropriate, above 0.1 ppm and to not contain CO₂ above 400 ppm and to not contain concentrations of other gasses that will interfere with instrument readings or cause the instrument to read concentrations of SO₂ or NO_x. Zero gasses for devices measuring components other than SO₂ or NO_x must be certified by the vendor to not contain a concentration of the target gas that is within the detection limit of the intended analyzer and

must not contain concentrations of other gasses that will interfere with or cause the analyzer to measure concentrations of the target gas. For measurement devices using dilution techniques, however, the same zero gas material used for dilution may be used as zero-level calibration gas.

e. High, mid and low-level measurement values for opacity monitors installed or replaced after April 1, 2001 (or, if subject to only DEP monitoring requirements, after the effective date of this manual), shall be in accordance with the requirements of ASTM D6216-98.

f. Thermocouples and recording devices must be calibrated each calendar quarter using NIST procedures, ASTM E220-86(1996)e1, or other procedures approved by the Department. This requirement may be waived provided that the procedures for daily calibration and quarterly calibration error check in 1 and 2 above are conducted, or if the thermocouple is of Type R (Platinum-10% Rhodium/Platinum) or S (Platinum-13% Rhodium/Platinum).

E. Periodic Self-Audits (except opacity). At least once in every four calendar quarters in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), conduct a System Performance Audit in accordance with the relative accuracy testing procedures listed in the 'Performance Testing (Phase II)' section of this Manual, except that if eight consecutive calendar quarters elapse after the last System Performance Audit, a System Performance Audit must be conducted within 720 source operating hours. Notification of System Performance Audit testing must be provided at least 21 days prior to testing. A periodic self-audit may not be conducted within 6 months of the previous periodic self-audit on the same existing, previously approved monitoring system to which no changes have been made.

F. Periodic Self-Audits (opacity). At least once in every four calendar quarters in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), conduct the Opacity Monitoring Relative Accuracy Test Procedure specified in the Phase II section of this Manual, except that if eight consecutive calendar quarters elapse after the last Opacity Monitoring Relative Accuracy Test, an Opacity Monitoring Relative Accuracy Test must be conducted within 720 source operating hours. Notification of Opacity Monitoring Relative Accuracy testing must be provided at least 21 days prior to testing. A periodic self-audit may not be conducted within 6 months of the previous periodic self-audit on the same existing, previously approved monitoring system to which no changes have been made.

G. Gas Cylinder Certification

Cylinder gases must be prepared in accordance with the then-current "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards" (Traceability Protocol. Total analytical uncertainty must not exceed 2.0%.

1. Multicomponent mixtures are acceptable provided that none of the components interferes with the analysis of other components and provided that individual components must not react with each other or with the balance gas.

2. Cylinder gases used to calibrate CEMSS employing critical orifice dilution techniques must be multicomponent mixtures to closely approximate the sonic velocity of the actual flue gases being monitored, unless other measures to compensate for sonic velocity discrepancies are approved by the Department.

H. F-factor determination.

1. For CEMSS requiring an F-factor for conversion of monitoring data to units of the applicable standard, published F-factors for uniform fuels (coal, oil, natural gas, etc., not blended) must be used unless fuel sampling and analysis

is conducted in order to determine an F-factor for the fuel being burned during relative accuracy testing.

2. For non-uniform fuels (culm, black liquor, etc.) daily fuel sampling must be conducted, with samples composited for analysis as follows:
 - a. Initially, analyses are to be conducted every 7 days. If the results of any 7-day analysis indicate a change of more than 5% in the value of the F-factor, the new value must be used for subsequent CEMS data.
 - b. If no analytical results indicate a change of more than 5% in the value of the F-factor for 12 consecutive 7-day periods, the frequency of analysis may be decreased to 30-day.
 - c. If the results of any 30-day analysis indicate a change of more than 5% in the value of the F-factor, the new value must be used for subsequent CEMS data and the frequency of analysis must be increased to 7-day.

II. Coal Sampling/Analysis Systems

A. Data Validation Criteria

1. Daily composite unit samples. A daily composite unit sample shall be considered invalid if any of the following conditions occur:

- a. The sampling/analysis system is not operated in accordance with the performance specifications set forth in this manual.
- b. The sampling/analysis system is not operated in accordance with the quality assurance criteria of this manual.
- c. Any combination of sampling/analysis system downtime and monitored unit downtime exceeds six consecutive hours.
- d. The actual weight of the daily composite unit sample is less than

$$0.75\bar{F}_{ia}C'_{ia} \text{ lbs}$$

where \bar{F}_{ia} = average of the actual factors of proportionality for unit i determined during the most recent performance specification test (lbs. sample/lb. fired).

C'_{ia} = weight of coal burned in unit i that day (lbs. fired)

- e. The actual factor of proportionality for the daily composite unit sample is not within $\pm 20\%$ of the average of the actual factors of proportionality for all valid composite unit samples within the system, unless all valid daily composite unit samples are analyzed individually and results weighted according to the actual amount of coal fired in each unit.

2. Daily Composite System Samples

- a. A daily composite system sample shall be considered invalid if the total actual valid sample weight is less than

$$0.75 \sum_{i=1}^M (\bar{F}_{ia} C'_{ia}) \text{ lbs}$$

Where M = number of units within the system

3. Laboratory sample analysis. The results of analysis of a laboratory sample shall be considered invalid if any of the following conditions occur:

- a. The next subsequent calibration check indicates noncompliance with Performance Specification 6 or Performance Specification 8.
- b. The precision of analysis for percent sulfur, dry basis, is not in compliance with Performance Specification 7.
- c. The precision of analysis for BTU/lb., dry basis, is not in compliance with Performance Specification 9.

B. Data Reduction Procedure

1. All data averages must be calculated using valid data only.
2. A daily average shall be considered valid if all of the data validation criteria above are complied with.
3. A running 30-day average shall be considered valid if it contains at least 23 valid daily averages.

C. Maintenance Requirements

1. Sulfur analyzer maintenance

- a. Conduct the test for calibration error, as specified in item III.B.6 of the "Performance Testing" section of this manual, immediately following any corrective maintenance to the sulfur analyzer.

2. Calorimeter Maintenance

- a. Conduct standardization of the calorimeter water equivalent, in accordance with ASTM D2015-77(78), Section 6, immediately following any corrective maintenance to the calorimeter.

3. Sample Acquisition Maintenance

- a. Conduct tests, as specified in items III.B.1, III.B.2, III.B.3, and III.B.4 of the "Performance Testing" section of this manual, immediately following any corrective maintenance to the point of sample acquisition.

4. Sample Preparation Maintenance

- a. Conduct tests, as specified in item III.B.5 of the "Performance Testing" section of this manual, immediately following any corrective maintenance on equipment used in sample preparation.

D. Periodic Recalibration

1. Quarterly Recalibration

Performance specification tests, as specified in items III.B.1 through III.B.11 of the "Performance Testing" section of this manual, must be conducted at least once each calendar quarter in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), except that if four consecutive calendar quarters elapse after the last such testing was performed, the testing must be performed within 168 source operating hours.

- E. Periodic Self-Audits (CSASs used to provide emission data). At least once in every four calendar quarters in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), conduct a System Performance Audit in accordance with the procedures in item III.B.12 of the "Performance Testing (Phase II)" section of this Manual, except that if eight consecutive calendar quarters elapse after the last System Performance Audit, a System Performance Audit must be conducted within 720 source operating hours. Notification of System Performance Audit testing must be provided at least 21 days prior to testing. A periodic self-audit may not be conducted within 6 months of a previous periodic self-audit on the same existing, previously approved monitoring system to which no changes have been made.

III. "Stack" Flow and Temperature Monitoring Systems

A. Data Validation Criteria

1. Data must be considered invalid if any of the following conditions occur:

- a. The monitoring system is not operated in accordance with the performance specifications in this manual.
- b. The monitoring system is not operated in accordance with the quality assurance criteria in the approved initial application (Phase I) or in this manual.
- c. Any portion of the monitoring system is inoperative.
- d. A calibration or zero drift for any measurement device exceeds twice the applicable calibration drift performance specification (applied to a single reading with no confidence coefficient) as indicated in this manual. Data is considered invalid until the next acceptable calibration.
- e. Calibration or zero drift check for a measurement device is not conducted during a calendar day. Data for any subsequent calendar days during which the source is operated is considered invalid until a successful drift check is initiated.
- f. The monitored process is not operating and/or not emitting the pollutant of interest.
- g. The required quarterly calibration error check for any measurement device exceeds the applicable performance standard. Data collected in the range failed (low, mid or high) is considered invalid until the next acceptable calibration error check except that if the initial quarterly calibration error check for any replacement measurement device exceeds the applicable performance standard, data collected in the range failed (low, mid or high) is also considered invalid back to the time of such replacement. Range of invalidated data must be from 0% to 30% of measurement device range for failure at the low level, from above 30% to 80% of measurement device range for failure at the mid level, and from greater than 80% to 100% of measurement device range for failure at the high level. If an "alternative" measurement value was used in accordance with the requirements listed below for either the mid or high measurement values, the range of invalidated data must be from 30% of measurement device range to 10% of measurement device range below the high-level measurement value for failure at the mid level, and from 10% of measurement device range below the high-level measurement value to 100% of measurement device range for failure at the high level.
- h. The required calibration error check is not conducted in accordance with the "quarterly calibration error check" requirements below. Data for subsequent quarters is considered invalid until a successful calibration error check is initiated.
- i. For measurement devices not undergoing daily calibration nor quarterly calibration error checks, if the quarterly calibration, conducted in accordance with the procedures in D.3 below, shows error in excess of the calibration error performance specification. Data is considered invalid for the entire time the measurement/readout device was used prior to the calibration and subsequent to a previously conducted successful calibration.
- j. The system fails a relative accuracy test. Data is considered invalid from the time results of the failed test are received by the company, or two months following test completion, whichever is earlier, until the commencement of the next acceptable relative accuracy test.

k. A relative accuracy test is not conducted during a calendar year. Data for subsequent calendar years is considered invalid until a successful relative accuracy test is initiated.

B. Data Reduction Criteria. The data reduction criteria of I.B, above, apply.

C. Component Maintenance or Replacement

1. Maintenance

a. Zero and calibration drift checks should be conducted immediately prior to any maintenance, if possible.

b. Zero and calibration drift checks must be conducted immediately following any maintenance.

c. If the post-maintenance zero or calibration drift checks show drift in excess of twice the applicable performance specifications, recalibration must be conducted in accordance with the quarterly calibration error check procedures in D.2. below. Measurement devices may be calibrated in-situ.

2. Addition or Replacement

a. Scheduled addition of or replacement of components or software programs with components or software programs of different makes or models requires submittal of the record of proposed maintenance prior to such change. For unscheduled addition of or replacement of components or software programs with components or software programs of different makes or models, submittal of the record of conducted maintenance must be made as soon as possible after such replacement. Successful completion of performance testing may be required prior to use of data from the monitoring system. Contact the Department for specific instructions.

b. Addition of or replacement of components or software programs with like makes and models may require successful completion of performance testing prior to use of data from the monitoring system. Contact the Department for specific instructions.

D. Periodic calibration

1. Daily calibration. For thermocouples, this requirement may be waived provided that quarterly recalibration is conducted in accordance with the procedures specified in 3 below.

a. Calibration must be conducted at least daily for determination of measurement device zero and calibration drift on all measurement device ranges.

b. Simulated measurement signals must be applied as close as possible to the point of measurement device signal generation.

c. The monitoring system must be adjusted whenever the zero or calibration drift performance specifications are exceeded.

d. The zero drift check must be conducted at a measurement level at or between 0% and 30% of measurement device range. The value selected must be lower than the lowest value that would be expected to occur under normal source operating conditions.

e. The calibration drift check must be conducted at a measurement level at or between 40% and 100% of measurement device range unless an alternative concentration can be demonstrated to better represent normal source operating levels.

2. Quarterly calibration error check. For thermocouples, this requirement may be waived provided that quarterly recalibration is conducted in accordance with the procedures specified in 3 below.
 - a. Conduct the test for calibration error on each range of each measurement device at least once during each calendar quarter in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), except that if four consecutive calendar quarters elapse after the last calibration error testing was performed, the test for calibration error must be performed within 168 source operating hours.
 - b. The high-level measurement values must be at or between 80% and 100% of measurement device range unless an alternative concentration can be demonstrated to better correspond to the level of the applicable emission standard or operational criterion. Alternatively, a high-level value may be used that is higher than the highest measurement device reading that occurred since the last calibration error check.
 - c. The mid-level measurement values used must be at or between 40% and 60% of measurement device range unless an alternative value can be demonstrated to better represent normal source operating levels.
 - d. The low-level measurement values used must be at or between 0% and 30% of measurement device range. The value selected must be lower than the lowest value that would be expected to occur under normal source operation conditions.
 3. Thermocouples, other measurement devices and recording devices must be calibrated each calendar quarter using NIST procedures, ASTM E220-86(1996)e1, or other procedures approved by the Department. This requirement may be waived provided that the procedures for daily calibration and quarterly calibration error check in 1 and 2 above are conducted, or if the thermocouple is of Type R (Platinum-10% Rhodium/Platinum) or S (Platinum-13% Rhodium/Platinum).
- E. Periodic Self-Audits for "Stack" Flow Monitoring Systems. At least once every four calendar quarters in which the source operates for 168 hours or more (If source did not operate at all during the calendar quarter, the provisions of the Extended outage/shutdown note, above, apply), conduct a System Performance Audit in accordance with the relative accuracy testing procedures listed in the "Performance Testing (Phase II)" section of this Manual, except that if eight consecutive calendar quarters elapse after the last System Performance Audit, a System Performance Audit must be conducted within 720 source operating hours. Notification of testing must be provided at least 21 days prior to testing. A periodic self-audit may not be conducted within 6 months of a previous periodic self-audit on the same existing, previously approved monitoring system to which no changes have been made.

MAJOR CHANGES TO CEM MANUAL FROM REVISION 6 TO REVISION 7

APPLICABILITY

- Added instructions for requesting alternatives to criteria in the manual.

SUBMITTAL AND APPROVAL

- Clarified that substantive changes, including changes to software, are subject to the applicable requirements of the Quality Assurance section of the manual.

INITIAL APPLICATION (PHASE I)

- Require copies of Phase I submittal to be sent to both the Bureau of Air Quality Regional and Central offices.
- Require Phase I submittal to follow outline format
- When electronic monitoring plan record formats are specified in Attachment No. 3, require submittal of those records.
- Clarified the definition of monitoring system to include hardware and software actually used as opposed to "required".
- Require submittal of UTM Northing, UTM Easting, UTM Zone, latitude and longitude of plant main gate (general public entrance - ENTGN per 013-0830-003 for identification/GIS purposes).
- Require submittal of the measurement device equivalent reading(s) at the level(s) of any emission standard(s) monitored by the specific measurement device range(s). The values determined are used to calculate measurement device drift.

TABLE I

- Incorporated recent changes to Performance Specification 1.
- Require only 1 cycle per minute for recording, while retaining requirement for at least 6 cycles per minute for measurement.
- Eliminated "Data recorder resolution (seconds)" specification as redundant with "Number of cycles per minute (recording)" specification.

TABLES II, III, IV, V, VI, IX, X, XI, and XII

- Removed reference to "Span Value" since it's only use was in determining zero and calibration drift.
- Removed double asterisks from "Data recorder resolution(% of lowest standard)" specification. Specification is 1.0 for all parameters

except opacity and O₂/CO₂, which are expressed in units of measurement.

TABLES II, IV, V, VI, IX, X, XI, and XII

- Restated zero and calibration drift specifications in terms of lowest emission standard equivalent as determined during Phase I.

TABLES II, IV, V, VI, XI

- Modified calculation procedures for relative accuracy and calibration error determinations in units of measurement for low reference method average concentrations.

TABLES II, III, IV, V, VI, XI

- Clarified that "% of standard" specification applies to lowest standard.

TABLE III

- Changed %O₂/%CO₂ calibration error specification to 0.5 for consistency with Federal requirements.

TABLES IV, V, VI

- Changed zero and calibration drift specifications to be consistent with Federal requirements and requirements for other parameters.

TABLES IV, V, VI, XI

- Changed ppm calibration error specification to 5.0 for consistency with specifications for SO₂ and NO_x.

TABLE X

- Clarified calibration error calculation.
- Require recording at only 1-minute intervals while retaining requirement to measure at 1-second intervals.
- Eliminated "Data recorder resolution (minutes)" specification as redundant with "Number of cycles per minute (recording)" specification.

TABLES XI and XII

- Clarified use of TABLE XI when pollutant or parameter is reported for compliance with emission standard or operational criterion and TABLE XII for parameters used as components in monitoring systems but for which specifications are not listed elsewhere.

TABLE XII

- Allow ASTM procedures or procedures approved by Department in addition to NIST procedures.

TABLE XIII

- Added a table for fuel flowmeter specifications.

PERFORMANCE TESTING (PHASE II)

- When electronic certification CEMS and analyzer test completion date record formats are specified in Attachment No. 3, require submission of those records.
- Removed requirement for Phase II testing to be completed within 180 days of Phase I approval for existing sources, since failure to collect valid data from an approved monitoring system, resulting in penalties for invalid data, should provide sufficient incentive.
- Allow for petition to consider data reporting from new CEMSS starting from time CEMS is installed, adjusted and calibrated, provided that no corrective maintenance occurs through completion of testing.
- Clarify retention of reports for data due to changes to existing monitoring systems until Department approval of new system is granted.

PERFORMANCE TESTING (PHASE II), I.A.

- Refer to alternative certification requirements for fuel flowmeters.

PERFORMANCE TESTING (PHASE II), I.B.2

- Clarified that all emission points serving the source combination to which the emission standard or operational criterion applies must be sampled simultaneously (consistent with the requirement to "Conduct the test for relative accuracy of the overall system results...").

PERFORMANCE TESTING (PHASE II), I.B.5

- Clarified that F-factor verification is only necessary if the F-factor is used to calculate results for comparison with standard.

PERFORMANCE TESTING (PHASE II), I.B.6, II.B.5

- For existing, previously approved monitoring systems, require reporting of results of aborted test runs or attempts or diagnostic testing.

PERFORMANCE TESTING (PHASE II), III.B.13

- For existing, previously approved monitoring systems, require reporting of results of aborted test runs or attempts or diagnostic testing.

FINAL APPROVAL (PHASE III)

- When electronic certification record formats are specified in Attachment No. 3, require submission of such records.
- Clarify value to be used as "reference value" for drift calculations.

RECORD KEEPING AND REPORTING, I.A.3.f., III.A.3.f.

- Clarify the need to maintain values of "K-factors" or other "constants".

RECORD KEEPING AND REPORTING, I.B.2, II.B.2, III.B.2

- Eliminate requirement to submit two copies of reports.

QUALITY ASSURANCE

- Address extended source shutdown.
- Address manual adjustments made to monitoring systems.

QUALITY ASSURANCE, I.A.1.e., III.A.1.e.

- Clarify that failure to conduct daily drift testing results in invalidation of data for all subsequent days during which source operates until an acceptable test is conducted.

QUALITY ASSURANCE, I.A.1.g., III.A.1.g.

- Clarified data validation for replacement measurement devices.
- Clarified range of data invalidation for failure of calibration error testing.

QUALITY ASSURANCE, I.A.1.i.

- Allow ASTM procedures or procedures approved by Department in addition to NIST procedures.

QUALITY ASSURANCE, I.A.1.j., III.A.1.j.

- Limited time for delay of invalidation due to failed relative accuracy testing to two months (consistent with the requirement to submit test report within two months of test completion).

QUALITY ASSURANCE, I.A.1.k.

- Clarified data invalidation due to not conducting periodic self-audits in accordance with applicable requirements.

QUALITY ASSURANCE, I.B.9., I.B.10., III.B.

- Changed language in requirements for valid 12-hour and daily averages to number of required hourly averages rather than limiting consecutive invalid hourly averages, to be consistent with language for other averages.

QUALITY ASSURANCE, I.C.

- Clarified requirements for component replacement with like makes and models

QUALITY ASSURANCE, I.D.1.a, I.D.2.a

- Refer to alternative quality assurance requirements for fuel flowmeters.

QUALITY ASSURANCE, I.D.1.d, e, f, I.D.2.b, c, d, e

- Refer to alternative calibration levels for newer opacity monitors.

QUALITY ASSURANCE, I.D.2.a, I.E, II.D.1.a, II.E, III.D.2.a, III.E

- Revised periodic calibration and periodic self-audit requirements to allow more flexibility for infrequently operated sources.

QUALITY ASSURANCE, I.D.2.d.

- Included requirements relative to zero gases.

QUALITY ASSURANCE, I.D.2.f.

- Clarified that calibration of thermocouples by NIST could be waived if daily and quarterly in-situ calibrations are conducted.
- Allow ASTM procedures or procedures approved by Department in addition to NIST procedures.
- Exempt Types R or S thermocouples from recalibration requirements.

QUALITY ASSURANCE, I.G.

- Due to enhanced requirements for Gas Manufacturers Intermediate Standards in the new edition of the "Traceability Protocol", removed reference to CGMISS.
- Allowed for alternative methods to compensate for sonic velocity discrepancies.

QUALITY ASSURANCE III.D.3.

- Allow ASTM procedures or procedures approved by Department in addition to NIST procedures.
- Exempt Types R and S thermocouples from recalibration requirements.

ATTACHMENT 1 (OPACITY SPECIFICATIONS AND PROCEDURES)

- Specify current 40 CFR Part 60, Performance Specification 1 rather than old Federal Register article.

ATTACHMENT 4 (DATA TELEMETRY)

- Restated requirements for data to be made available. Require sources to provide information in a format acceptable to the appropriate Regional office.

ATTACHMENT 5 (MAJOR CHANGES)

- Moved to body of manual.

APPENDIX

Attachment No. 1 - ``Standards of Performance for New Stationary Sources,`` 40
CFR, Chapter I, Subchapter C, Part 60, Performance Specification
1

Attachment No. 2 - 44 FR 58602 (10/10/79)

Attachment No. 3 - Standard Electronic Data Reporting Formats

Attachment No. 4 - Data Telemetry Protocol

Attachment No. 2 is available via the Internet at:

<http://www.dep.state.pa.us/dep/deputate/airwaste/aq/cemspage/cemshome.htm>

ATTACHMENT NO. 1

``Standards of Performance for New Stationary Sources,`` 40 CFR, Chapter I, Subchapter C, Part 60, Performance Specification 1 may be obtained from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-2938. A copy may also be available via the internet at:

<http://www.dep.state.pa.us/dep/deputate/airwaste/aq/cemspage/cemshome.htm>

ATTACHMENT NO. 2

This attachment (44 FR 58602 [10/10/79] "Standards of Performance for New Stationary Sources; Continuous Monitoring Performance Specifications") is available via the Internet at:

<http://www.dep.state.pa.us/dep/deputate/airwaste/aq/cemspage/cemshome.htm>

**Pennsylvania Department of Environmental Protection
Bureau of Air Quality**

**Electronic Data Reporting
Format**

ATTACHMENT NO. 3

DEFINITIONS OF PROCESS CODES IN REPORTS

PROCESS CODES

- 01= CHANGING FUELS
Use only for hour during which fuel or fuel mix is significantly changed
- 02= CONTROL EQUIP. MALF.
Use for any hour during which pollution control equipment malfunctions
- 03= STARTUP
Use for hours between "PROCESS DOWN" and "NORMAL OPERATION"
- 04= SHUTDOWN
Use for hours between "NORMAL OPERATION" and "PROCESS DOWN"
- 05= CHANGING OPERATING LEVEL
Use for hour during which process level is significantly changed (not for normal fluctuations)
- 06= CLEAN PROCESS EQUIP.
Use for any hour during which process equipment cleaning (soot blowing, etc.) occurs
- 07= CLEAN CONTROL EQUIP.
Use for any hour during which pollution control equipment cleaning (bag shaking, rapping, etc.) occurs
- 08= NORMAL OPERATION
Default code
- 09= OTHER
Use only when directed by DEP

ATTACHMENT NO. 3

DEFINITIONS OF MONITORING CODES IN REPORTS

MONITORING CODES

- 10= REQUIRED ADJUSTMENT NOT MADE
No longer applicable
- 11= EXCESS DRIFT PRIMARY ANALYZER
Use for hours invalid due to excess drift of primary analyzer (usually pollutant analyzer)
- 12= EXCESS DRIFT ANCILLARY ANALYZER
Use for hours invalid due to excess drift of ancillary analyzer (diluent, etc.)
- 13= PROCESS DOWN
Use for hours when process is not operating AND pollutant is not being emitted.
- For example:
OPACITY - source not operating and air flow less than needed for startup of source
SO₂ - no sulfur-bearing fuel burned
NO_x - no combustion occurring
- For incinerators:
CE - no waste being burned
CO - "
HCL - "
O₂ - "
TEMPERATURE - "
- 14= RECALIBRATION
Use for hours invalid due to calibration (daily, quarterly, maintenance, etc.)
- 15= PREVENTIVE MAINTENANCE
Use for hours invalid due to preventive maintenance
- 16= PRIMARY ANALYZER MALFUNCTION
Use for hours invalid due to malfunction of primary analyzer (usually pollutant)
- 17= ANCILLARY ANALYZER MALFUNCTION
Use for hours invalid due to malfunction of ancillary analyzer (diluent, etc.)
- 18= DATA HANDLING SYSTEM MALFUNCTION
Use for hours invalid due to malfunction of any part of data handling system
- 19= SAMPLE INTERFACE MALFUNCTION
Use for hours invalid due to malfunction of any part of sample acquisition and conditioning system (probe, sample line, dryers, etc.)
- 20= CORRECTIVE MAINTENANCE
Use for hours invalid due to corrective maintenance
- 21= OTHER
Use only when directed by DEP

ATTACHMENT NO. 3

CEMS DATA FORMAT FOR FLOPPY DISKS (Hourly Averages)

NOTE: Data must be recorded on floppy disks readable by IBM PC-compatible computer disk drives in one of the following formats:

- DS, DD, 96TPI, 5-1/4 inch, 360K
- DS, HD, 96TPI, 5-1/4 inch, 1.2M
- DS, DD, 135TPI, 3-1/2 inch, 720K
- DS, HD, 135TPI, 3-1/2 inch, 1.4M

File names: iiiiisaH.qyy where - iiii = CEMS ID NO. assigned by DEP
s = SOURCE ID NO. assigned by DEP
a = ANALYZER ID NO. assigned by DEP
(always '0' for reports)
q = QUARTER NO. (1-4)
yy = LAST 2 DIGITS OF YEAR

Data is recorded on a source basis corrected (for moisture, %O₂, etc.) as standard upper case ASCII text as follows:

([CR] = carriage return, Decimal ASCII 13; [LF] = line feed, Decimal ASCII 10; [FF] = form feed, Decimal ASCII 12; \ = space, Decimal ASCII 32; [EOF] = end of file, Decimal ASCII 26)

(Upper case indicates literal entry, lower case indicates replace with actual information)

Line Data

```
1    STANDARD\EMISSIONS\REPORT\PAGE\1[CR][LF]
2    COMPANY\NAME:\company name[CR][LF]
3    LOCATION:\location[CR][LF]
4    SOURCE:\source name[CR][LF]
5    CEMS\ID\NO.\(+SOURCE\ID+ANALYZER\ID):\iiiiisa[CR][LF]
6    PARAMETER:\parameter name (opacity, temperature, etc.)[CR][LF]
7    QUARTER:\q[CR][LF]
8    YEAR:\yy[CR][LF]
9    UNITS:\units reported (PPM, %X100, DEGREES, etc.)[CR][LF]
10    [CR][LF]
11    HOUR\1\2\3\4\5\6\7\8[CR][LF]
12    \9\10\11\12\13\14\15\16[CR][LF]
13    \17\18\19\20\21\22\23\24[CR][LF]
14    \\XXXX.PC\XXXX.PC\XXXX.PC\XXXX.PC\XXXX.PC\XXXX.PC\XXXX.PC\XXXX.PC[CR][LF]
15    DAY[CR][LF]
16    01\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF]
17    \\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF]
18    \\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF]
19    repeat lines 16 through 18, replacing 1st 2 characters with 02, 03, etc.
thru
57
58    15\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF]
59    \\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF]
60    \\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc\xxxx.pc[CR][LF][FF]
61    STANDARD\EMISSIONS\REPORT\PAGE\2[CR][LF]
62    CEMS\ID\NO.\(+SOURCE\ID+ANALYZER\ID):\iiiiisa[CR][LF]
63    QUARTER:\q[CR][LF]
64    YEAR:\yy[CR][LF]
65    repeat lines 11 through 15
thru
69
70    repeat lines 16 through 18, replacing 1st 2 characters with 16, 17, etc.
thru
117
```


ATTACHMENT NO. 3

```
346 [CR] [LF]
347 MONITORING\CODES\ (MC) \ (XXXX=IMC\if\invalid): [CR] [LF]
348 10=\REQUIRED\ADJUSTMENT\NOT\MADE\16=\PRIMARY\ANALYZER\MALFUNCTION [CR] [LF]
349 11=\EXCESS\DRIFT\PRIMARY\ANALYZER\17=\ANCILLARY\ANALYZER\MALFUNCTION [CR] [LF]
350 12=\EXCESS\DRIFT\ANCILLARY\ANALYZER\18=\DATA\HANDLING\SYSTEM\MALFUNCTION [CR] [LF]
351 13=\PROCESS\DOWN\19=\SAMPLE\INTERFACE\MALFUNCTION [CR] [LF]
352 14=\RECLIBRATION\20=\CORRECTIVE\MAINTENANCE [CR] [LF]
353 15=\PREVENTIVE\MAINTENANCE\21=\OTHER [CR] [LF]
354 TO\THE\BEST\OF\MY\KNOWLEDGE, \THE\INFORMATION\IN\THIS\REPORT\REPRESENTS\TRUE [CR] [LF]
355 AND\ACCURATE\DATA. [CR] [LF]
356 [CR] [LF]
357 XXXX=\PPM\ \FOR\HCL\SO2\CO\NOX
358
359 \\\\\\%X100\FOR\O2,C.E.,SO2R\ \SIGNED\_____ [CR] [LF]
360 \\\\\\HCLR,OPACITY [CR] [LF]
361 \\\\\\DEG\ \FOR\TEMPERATURE\ \TITLE\_____ [CR] [LF]
361 [EOF]
```

NOTE: for xxxx = ppm or degrees, truncate to whole number
= % O2, C.E., SO2R, HCLR, OR OPACITY, multiply by 100 and truncate to whole number

ALWAYS FILL xxxx WITH LEADING ZEROS!!!

ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 1

COMPANY NAME:

LOCATION:

SOURCE:

CEMS ID NO. (+SOURCE ID+ANALYZER ID):

PARAMETER:

QUARTER:

YEAR:

UNITS:

HOUR	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC
DAY								
01	.....	.....	.....	.....	.....	.....	.....	.....
02	.....	.....	.....	.....	.....	.....	.....	.....
03	.....	.....	.....	.....	.....	.....	.....	.....
04	.....	.....	.....	.....	.....	.....	.....	.....
05	.....	.....	.....	.....	.....	.....	.....	.....
06	.....	.....	.....	.....	.....	.....	.....	.....
07	.....	.....	.....	.....	.....	.....	.....	.....
08	.....	.....	.....	.....	.....	.....	.....	.....
09	.....	.....	.....	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	.....	.....
12	.....	.....	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	.....	.....	.....	.....	.....
14	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	.....	.....	.....	.....	.....

ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 2

CEMS ID NO. (+SOURCE ID+ANALYZER ID):

QUARTER:

YEAR:

HOURLY	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC

DAY

16	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
17	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
18	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
19	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
20	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
21	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
22	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
23	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
24	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
25	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
26	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
27	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
28	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
29	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
30	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
31	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
32	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.
	_____.	_____.	_____.	_____.	_____.	_____.	_____.	_____.

ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 3
CEMS ID NO. (+SOURCE ID+ANALYZER ID):
QUARTER:
YEAR:

HOURLY	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC
DAY								
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ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 4
CEMS ID NO. (+SOURCE ID+ANALYZER ID):
QUARTER:
YEAR:

HOURL	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC
DAY								
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ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 5
CEMS ID NO. (+SOURCE ID+ANALYZER ID):
QUARTER:
YEAR:

HOURL	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC
DAY								
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ATTACHMENT NO. 3

STANDARD EMISSIONS REPORT PAGE 6
 CEMS ID NO. (+SOURCE ID+ANALYZER ID):
 QUARTER:
 YEAR:

HOUR	1	2	3	4	5	6	7	8
	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24
	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC	XXXX.PC

DAY								
84	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
85	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
86	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
87	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
88	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
89	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
90	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
91	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
92	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____

CALIBRATION ERROR CHECK RESULTS (%):

ID	_____	_____	_____	_____	_____	_____	_____	_____
LO	_____	_____	_____	_____	_____	_____	_____	_____
MD	_____	_____	_____	_____	_____	_____	_____	_____
HI	_____	_____	_____	_____	_____	_____	_____	_____

PROCESS CODES (PC):

01= CHANGING FUELS	04= SHUTDOWN	07= CLEAN CONTROL EQUIP.
02= CONTROL EQUIP. MALF.	05= CHANGING OPERATING LEVEL	08= NORMAL OPERATION
03= STARTUP	06= CLEAN PROCESS EQUIP.	09= OTHER

MONITORING CODES (MC) (XXXX=IIMC if invalid):

10= REQUIRED ADJUSTMENT NOT MADE	16= PRIMARY ANALYZER MALFUNCTION
11= EXCESS DRIFT PRIMARY ANALYZER	17= ANCILLARY ANALYZER MALFUNCTION
12= EXCESS DRIFT ANCILLARY ANALYZER	18= DATA HANDLING SYSTEM MALFUNCTION
13= PROCESS DOWN	19= SAMPLE INTERFACE MALFUNCTION
14= RECALIBRATION	20= CORRECTIVE MAINTENANCE
15= PREVENTIVE MAINTENANCE	21= OTHER

TO THE BEST OF MY KNOWLEDGE, THE INFORMATION IN THIS REPORT REPRESENTS TRUE AND ACCURATE DATA.

XXXX = PPM FOR HCL, SO2, CO, NOX
 %X100 FOR O2, C.E., SO2R SIGNED _____
 HCLR, OPACITY
 DEG FOR TEMPERATURE TITLE _____

ATTACHMENT NO. 3

INSTRUCTIONS
STANDARD EMISSIONS REPORT
(Hourly Averages, Hard Copy and Floppy Disk)

NOTE: ALL ALPHABETIC ENTRIES TO BE MADE IN UPPER CASE

DESCRIPTIVE INFORMATION:

"COMPANY NAME:" - Enter company name as it appears in DEP correspondence.
"LOCATION:" - Enter location as it appears in DEP correspondence.
"SOURCE:" - Enter source name as it appears in DEP correspondence.
"CEMS ID NO. (+SOURCE ID+ANALYZER ID):"
- Enter number (iiiiisa) where:
 iiii = CEMS ID NO. assigned by DEP
 s = SOURCE ID NO. assigned by DEP
 a = ANALYZER ID NO. assigned by DEP
 (0 if reporting data corrected in terms of standard)
"PARAMETER:" - Enter name of pollutant/parameter monitored (i.e. OPACITY, SO2,
 Temperature, C.E., etc.)
"QUARTER:" - Enter number of quarter (1, 2, 3 or 4)
"YEAR:" - Enter last 2 digits of year (89, etc.)
"UNITS:" - Enter units reported (PPM, %X100, DEGREES, etc.)

HOURLY DATA/MONITORING CODES/PROCESS CODES:

For each hour of valid monitoring data, enter the hourly average (####) as follows:

If units are PPM or DEGREES, truncate to whole number and enter preceded by leading zeros if necessary to fill 4 spaces.

If units are %X100 (use whenever reporting data collected/calculated as %), multiply % by 100, truncate to whole number and enter preceded by leading zeros if necessary to fill 4 spaces.

For other units, contact the Source Testing and Monitoring Section for instructions.

For each hour of invalid monitoring data, enter II##, where ## = Monitoring Code (10-21) most responsible for invalidation of data.

For each hour of either valid or invalid monitoring data, enter the Process Code (01-09) that best represents the operating conditions of the process during that hour. The process code is to be entered following the period that separates it from the data entry.

CALIBRATION ERROR CHECK RESULTS:

For each analyzer involved in determining the reported data, enter the "CEMS ID NO. (+SOURCE ID+ANALYZER ID)" (as explained above) and the low (LO), mid (MD) and high (HI) calibration error check results from the required quarterly calibration error check. Report as percentages truncated to the "tenths" place. When more than one calibration error check is conducted during the quarter, report only the first set of results obtained.

SIGNATURE AND TITLE:

The report must be signed by the person having managerial responsibility for the source. The title of the person signing the report must appear below the signature.

ATTACHMENT NO. 3

CEMS DATA FORMAT FOR FLOPPY DISKS (Opacity Excess Emissions)

NOTE: Data must be recorded on floppy disks readable by IBM PC-compatible computer disk drives in one of the following formats:

- DS, DD, 96TPI, 5-1/4 inch, 360K
- DS, HD, 96TPI, 5-1/4 inch, 1.2M
- DS, DD, 135TPI, 3-1/2 inch, 720K
- DS, HD, 135TPI, 3-1/2 inch, 1.4M

File names: iiiiisaE.qyy where - iiii = CEMS ID NO. assigned by DEP
s = SOURCE ID NO. assigned by DEP
a = ANALYZER ID NO. (always '0' for reports)
q = QUARTER NO. (1-4)
yy = LAST 2 DIGITS OF YEAR

Data is recorded on a source basis as standard upper case ASCII text as follows:

([CR] = carriage return, Decimal Ascii 13; [LF] = line feed, Decimal Ascii 10; [FF] = form feed, Decimal Ascii 12; \ = space, Decimal Ascii 32; [EOF] = end of file, Decimal Ascii 26)

(Upper case indicates literal entry, lower case indicates replace with actual information)

Line Data

```
1  OPACITY\EXCESS\EMISSIONS\REPORT\PAGE\1[CR][LF]
2  COMPANY\NAME:\company name[CR][LF]
3  LOCATION:\location[CR][LF]
4  SOURCE:\source name[CR][LF]
5  CEMS ID NO. (+SOURCE ID+ANALYZER ID):\iiiiisa[CR][LF]
6  QUARTER:\q[CR][LF]
7  YEAR:\yy[CR][LF]
8  \\\STAT\#MIN\#MIN\1MAX\4MAX\!!\\\STAT\#MIN\#MIN\1MAX\4MAX[CR][LF]
9  DATE\\HR\CODE\10-29\>29\MIN\MIN\!!\DATE\\HR\CODE\10-29\>29\MIN\MIN[CR][LF]
10 [CR][LF]
11 xx/xx/xx\xx\xx\xx\xx\xx\xx\xx\xx\xx\xx\xx\xx\!!\xx/xx/xx\xx\xx\xx\xx\xx\xx\xx[CR][LF]
12 repeat line 11 thru 50
51 PROCESS\OPERATIONAL\STATUS\CODES:[CR][LF]
52 01=\CHANGING\FUELS\04=\SHUTDOWN\07=\CLEAN\CONTROL\EQUIP.[CR][LF]
53 02=\CONTROL\EQUIP.\MALF.\05=\CHANGING\OPERATING\LEVEL\08=\NORMAL\OPERATION[CR][LF]
54 03=\STARTUP\06=\CLEAN\PROCESS\EQUIP.\09=[CR][LF]
55 [CR][LF]
56 TO\THE\BEST\OF\MY\KNOWLEDGE,\THE\INFORMATION\IN\THIS\REPORT\REPRESENTS\TRUE[CR][LF]
57 AND\ACCURATE\DATA.[CR][LF]
58
\\SIGNED\_____ [CR][LF]
59 [CR][LF]
60
\\TITLE\_____ [CR][LF]
```

If additional data must be reported, enter [FF] then repeat lines 1 through 60, but identify as PAGE 2, PAGE 3, etc.

Last line of report must be: [EOF]

ATTACHMENT NO. 3

INSTRUCTIONS
OPACITY EXCESS EMISSIONS REPORT
(Hard Copy and Floppy Disk)

NOTE: ALL ALPHABETIC ENTRIES TO BE MADE IN UPPER CASE

DESCRIPTIVE INFORMATION:

"COMPANY NAME:" - Enter company name as it appears in DEP correspondence.
"LOCATION:" - Enter location as it appears in DEP correspondence.
"SOURCE:" - Enter source name as it appears in DEP correspondence.
"CEMS ID NO. (+SOURCE ID+ANALYZER ID):"
- Enter number (iiiiisa) where:
 iiii = CEMS ID NO. assigned by DEP
 s = SOURCE ID NO. assigned by DEP
 a = ANALYZER ID NO. assigned by DEP
 (0 if reporting data corrected in terms of standard)
"QUARTER:" - Enter number of quarter (1, 2, 3 or 4)
"YEAR:" - Enter last 2 digits of year (89, etc.)

DATA/PROCESS CODES:

NOTE - Alternate columns for entries (1st entry in left column, 2nd in right column, 3rd in left column, etc.)

For each hour when excess emissions occurred, enter:

DATE - Enter as mm/dd/yy using leading zeros where appropriate.

HR - Enter as 01 through 24 using leading zeros as necessary to fill 2 spaces.

PC - Enter appropriate Process Code using leading zeros as necessary to fill 2 spaces. Use code which best represents the operating conditions of the process during the hour.

#MIN 10-29 - Enter the number of one-minute averages in the specified range (for standards other than MWI opacity standards, contact the Source Testing and Monitoring Section for specific instructions), using leading zeros as necessary to fill 2 spaces.

#MIN >29 - Enter the number of one-minute averages in the specified range (for standards other than MWI opacity standards, contact the Source Testing and Monitoring Section for specific instructions), using leading zeros as necessary to fill 2 spaces.

1MAX MIN - Enter the value of the highest one-minute average during the hour (01-99) using leading zeros as necessary to fill 2 spaces.

4MAX MIN - Enter the value of the fourth highest one-minute average during the hour (01-99) using leading zeros as necessary to fill 2 spaces.

SIGNATURE AND TITLE:

The report must be signed by the person having managerial responsibility for the source. The title of the person signing the report must appear below the signature.

ATTACHMENT NO. 3

CEMS DATA FORMAT FOR FLOPPY DISKS (Low Temperature Report)

NOTE: Data must be recorded on floppy disks readable by IBM PC-compatible computer disk drives in one of the following formats:

- DS, DD, 96TPI, 5-1/4 inch, 360K
- DS, HD, 96TPI, 5-1/4 inch, 1.2M
- DS, DD, 135TPI, 3-1/2 inch, 720K
- DS, HD, 135TPI, 3-1/2 inch, 1.4M

File names: iiiiisaT.qyy where - iiii = CEMS ID NO. assigned by DEP
s = SOURCE ID NO. assigned by DEP
a = ANALYZER ID NO. (always '0' for reports)
q = QUARTER NO. (1-4)
yy = LAST 2 DIGITS OF YEAR

Data is recorded on a source basis as standard upper case ASCII text as follows:

([CR] = carriage return, Decimal Ascii 13; [LF] = line feed, Decimal Ascii 10; [FF] = form feed, Decimal Ascii 12; \ = space, Decimal Ascii 32; [EOF] = end of file, Decimal Ascii 26)

(Upper case indicates literal entry, lower case indicates replace with actual information)

Line Data

```
1 LOW\TEMPERATURE\REPORT\PAGE\1[CR][LF]
2 COMPANY\NAME:\company name[CR][LF]
3 LOCATION:\location[CR][LF]
4 SOURCE:\source name[CR][LF]
5 CEMS ID NO. (+SOURCE ID+ANALYZER ID):\iiiiisa[CR][LF]
6 QUARTER:\q[CR][LF]
7 YEAR:\yy[CR][LF]
8 DATE\\\HOUR\MIN\#MIN\\\AVG\LOW\\!!\DATE\\\HOUR\MIN\#MIN\\\AVG\LOW\[CR][LF]
9 START\\BEG\\BEG\LONG\PC\XXXX\XXXX\\!!\START\\BEG\\BEG\LONG\PC\XXXX\XXXX[CR][LF]
10 [CR][LF]
11 xx/xx/xx\xx\\\xx\xxxx\xx\xxxx\xxxx\\!!\xx/xx/xx\xx\\\xx\xxxx\xx\xxxx\xxxx[CR][LF]
12 repeat line 11
thru
49
50 PROCESS\CODES\PC:[CR][LF]
51 01=\CHANGING\FUELS\\\04=\SHUTDOWN\\\07=\CLEAN\CONTROL\EQUIP.[CR][LF]
52 02=\CONTROL\EQUIP.\MALF.\05=\CHANGING\OPERATING\LEVEL\08=\NORMAL\OPERATION[CR][LF]
53 03=\STARTUP\\\06=\CLEAN\PROCESS\EQUIP.\\\09=\OTHER[CR][LF]
54 [CR][LF]
55 TO\THE\BEST\OF\MY\KNOWLEDGE,\THE\INFORMATION\IN\THIS\REPORT\REPRESENTS\TRUE[CR][LF]
56 AND\ACCURATE\DATA.[CR][LF]
57 [CR][LF]
58
59 XXXX\=\DEG\\\FOR\TEMPERATURE\\\SIGNED\_____ [CR][LF]
60 [CR][LF]
61 \\\TITLE\_____ [CR][LF]
If additional data must be reported, enter [FF] then repeat lines 1 through 60, but identify
as PAGE 2, PAGE 3, etc.
```

Last line of report must be: [EOF]

ATTACHMENT NO. 3

INSTRUCTIONS
LOW TEMPERATURE REPORT
(Hard Copy and Floppy Disk)

NOTE: ALL ALPHABETIC ENTRIES TO BE MADE IN UPPER CASE

DESCRIPTIVE INFORMATION:

"COMPANY NAME:" - Enter company name as it appears in DEP correspondence.
"LOCATION:" - Enter location as it appears in DEP correspondence.
"SOURCE:" - Enter source name as it appears in DEP correspondence.
"CEMS ID NO. (+SOURCE ID+ANALYZER ID):"
- Enter number (iiiiisa) where:
 iiii = CEMS ID NO. assigned by DEP
 s = SOURCE ID NO. assigned by DEP
 a = ANALYZER ID NO. assigned by DEP
 (0 if reporting data corrected in terms of standard)
"QUARTER:" - Enter number of quarter (1, 2, 3 or 4)
"YEAR:" - Enter last 2 digits of year (89, etc.)

DATA/PROCESS CODES:

NOTE - Alternate columns for entries (1st entry in left column, 2nd in right column, 3rd in left column, etc.)

For each hour when low temperature occurred, enter:

DATE BEG - Enter date as mm/dd/yy using leading zeros where appropriate.
HR BEG - Enter hour as 01 through 24 using leading zeros as necessary to fill 2 spaces.
MIN BEG - Enter minute low temperature incident began as 01 through 60 using leading zeros as necessary to fill 2 spaces.
#MIN LONG - Enter the number of minutes of low temperature during the hour using leading zeros as necessary to fill 4 spaces.
PC - Enter appropriate Process Code using leading zeros as necessary to fill 2 spaces. Use code which best represents the operating conditions of the process during the hour.
AVG xxxx - Enter the average of the low temperatures using leading zeros as necessary to fill 4 spaces.
LOW xxxx - Enter the lowest one-minute average temperature during the hour using leading zeros as necessary to fill 4 spaces.

SIGNATURE AND TITLE:

The report must be signed by the person having managerial responsibility for the source. The title of the person signing the report must appear below the signature.

ATTACHMENT NO. 3

CEMS DATA FORMAT FOR FLOPPY DISKS (Interlock Incident Report)

NOTE: Data must be recorded on floppy disks readable by IBM PC-compatible computer disk drives in one of the following formats:

- DS, DD, 96TPI, 5-1/4 inch, 360K
- DS, HD, 96TPI, 5-1/4 inch, 1.2M
- DS, DD, 135TPI, 3-1/2 inch, 720K
- DS, HD, 135TPI, 3-1/2 inch, 1.4M

File names: iiiiisaI.qyy where - iiii = CEMS ID NO. assigned by DEP
(of associated opacity CEMS)
s = SOURCE ID NO. assigned by DEP
a = ANALYZER ID NO. (always '0' for reports)
q = QUARTER NO. (1-4)
yy = LAST 2 DIGITS OF YEAR

Data is recorded on a source basis as standard upper case ASCII text as follows:

([CR] = carriage return, Decimal Ascii 13; [LF] = line feed, Decimal Ascii 10; [FF] = form feed, Decimal Ascii 12; \ = space, Decimal Ascii 32; [EOF] = end of file, Decimal Ascii 26)

(Upper case indicates literal entry, lower case indicates replace with actual information)

Line Data

```
1 INTERLOCK\INCIDENT\REPORT\PAGE\1[CR][LF]
2 COMPANY\NAME:\company name[CR][LF]
3 LOCATION:\location[CR][LF]
4 SOURCE:\source name[CR][LF]
5 CEMS ID NO. (+SOURCE ID+ANALYZER ID):\iiiiisa[CR][LF]
6 QUARTER:q[CR][LF]
7 YEAR:yy[CR][LF]
8 DATE\\HOUR\MIN\#MIN\AVG\\PARAMETER\\!!\DATE\\HOUR\MIN\#MIN\AVG\\PARAMETER[CR][LF]
9 START\\BEG\\BEG\LONG\XXXX\NAME\\!!\START\\BEG\\BEG\LONG\XXXX\NAME[CR][LF]
10 [CR][LF]
11
xx/xx/xx\xx\\xx\xxxx\xxxx\XXXXXXXXXXXXX\!!\xx/xx/xx\xx\\xx\xxxx\xxxx\XXXXXXXXXXXXX[CR][LF]
12 repeat line 11
thru
53
54 [CR][LF]
55 TO\THE\BEST\OF\MY\KNOWLEDGE,\THE\INFORMATION\IN\THIS\REPORT\REPRESENTS\TRUE[CR][LF]
56 AND\ACCURATE\DATA.[CR][LF]
57 [CR][LF]
58
XXXX\=%X100\FOR\C.E.,O2,OPACITY\\SIGNED\_____ [CR][LF]
59 \\DEG\\FOR\TEMPERATURE[CR][LF]
60
\\TITLE\_____ [CR][LF]
If additional data must be reported, enter [FF] then repeat lines 1 through 60, but identify
as PAGE 2, PAGE 3, etc.
```

Last line of report must be: [EOF]

ATTACHMENT NO. 3

INSTRUCTIONS MWI INTERLOCK INCIDENT REPORT (Hard Copy and Floppy Disk)

NOTE: ALL ALPHABETIC ENTRIES TO BE MADE IN UPPER CASE

DESCRIPTIVE INFORMATION:

"COMPANY NAME:" - Enter company name as it appears in DEP correspondence.
"LOCATION:" - Enter location as it appears in DEP correspondence.
"SOURCE:" - Enter source name as it appears in DEP correspondence.
"CEMS ID NO. (+SOURCE ID+ANALYZER ID):"
- Enter number (iiiiisa) of associated opacity CEMS where:
 iiii = CEMS ID NO. assigned by DEP
 s = SOURCE ID NO. assigned by DEP
 a = ANALYZER ID NO. assigned by DEP
 (0 if reporting data corrected in terms of standard)
"QUARTER:" - Enter number of quarter (1, 2, 3 or 4)
"YEAR:" - Enter last 2 digits of year (89, etc.)

DATA/PROCESS CODES:

NOTE - Alternate columns for entries (1st entry in left column, 2nd in right column, 3rd in left column, etc.)

For each hour when an incident requiring cessation of waste charging occurred, enter:

DATE BEG - Enter date waste charging was ceased as mm/dd/yy using leading zeros where appropriate.
HR BEG - Enter hour waste charging was ceased as 01 through 24 using leading zeros as necessary to fill 2 spaces.
MN BEG - Enter minute waste charging was ceased as 01 through 60 using leading zeros as necessary to fill 2 spaces.
#MIN LONG - Enter the length of the incident during the hour (until compliance with all standards was achieved, thus allowing charging of waste) in minutes using leading zeros as necessary to fill 4 spaces.
PC - Enter appropriate Process Code using leading zeros as necessary to fill 2 spaces. Use code which best represents the operating conditions of the process during the hour.
AVG xxxx - Enter the average value, during non-charging time, of the parameter responsible for cessation of waste charging (Opacity, Temperature, O2, C.E.) using leading zeros as necessary to fill 4 spaces. For Temperature, enter as degrees. For Opacity, O2 and C.E. enter as %X100 truncated to a whole number.

PARAMETER

NAME - Enter the name of the parameter responsible for cessation of waste charging (Opacity, Temperature, O2, C.E.).

SIGNATURE AND TITLE:

The report must be signed by the person having managerial responsibility for the source. The title of the person signing the report must appear below the signature.

ATTACHMENT NO. 4

DATA RECORD KEEPING AND REPORTING FOR TELEMETRY

Data, process codes and monitoring codes for each analyzer, in "raw" analyzer measurement units, and for each CEMS, in measurement units of the applicable standard, must be recorded for one-minute, one-hour and 24-hour averaging periods. The data telemetry system must provide the capability to display records to remote users based on user selection of analyzers or CEMSs and range of dates and times. Data must be maintained on-line for four months.

DATA TELEMETRY DATA ACCESS

The source must provide the capability to display information to remote users in a manner acceptable to the appropriate DEP Regional office. The data telemetry system must allow simultaneous, exclusive access to information by at least one DEP staff member and at least one other.

Department of Environmental Protection
Bureau of Air Quality
Division of Source Testing and Monitoring
P.O. Box 8468
Harrisburg, PA 17105-8468

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