CHAPTER 1

Compliance Branch COMS Guidance Manual

Chapter 1
Quality Assurance for Continuous Opacity Monitoring
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APPLICABILITY

The Indiana Department of Environmental Management, Office of Air Quality, Compliance Data Section issues these guidelines and requirements in this chapter for reliable and accurate continuous opacity monitoring.

Monitoring requirements include, but are not limited to:

- Equipment and design specifications
- Performance specifications and test procedures
- Certification and recertification requirements
- Data availability requirements
- Quality assurance plan and standard operating procedure requirements
- Quality assurance and quality control requirements
- Reporting and record keeping requirements

Requirements and guidelines contained in this chapter apply to sources that must operate continuous opacity monitoring systems (COMS) used to determine compliance with federal, state, and local regulations in Indiana. Performance and design specification requirements n 40 CFR part 60, Appendix B (PS-1) are incorporated into this chapter. Certification requirements, Standard Operation Procedure (SOP) requirements, quality assurance requirements, record keeping requirements, and reporting requirements are also contained in the state rules: 326 IAC 3-5-3, Monitor system certification, 326 IAC 3-5-4, Standard operating procedures; 326 IAC 3-5-5 Quality assurance requirements; 326 IAC 3-5-6 Record keeping requirements; and 326 IAC 3-5-6 Reporting requirements are included in attachment #4 to this chapter.

1.0 CONTINUOUS OPACITY MONITOR OPERATING PRINCIPLES

1.1 Introduction

A continuous opacity monitor or transmissometer (transmission monitor) measures the transmittance of light that passes through an effluent gas (stack, duct, or flue gas). Although the terms opacity monitor and transmissometer can be used interchangeably, this chapter will use the term Continuous Opacity Monitor (COM) or Continuous Opacity Monitoring System (COMS) throughout the remainder of this text.

Questions concerning anything contained in this chapter can be directed to the following address or phone number:

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1.2 Definitions

Definitions of the terms used in this chapter are listed below. Additional definitions may be found in Attachment 1-Performance Specification 1 (PS-1), Section 3.

Accuracy - The measure of the closeness of a measurement to it's true value. Although the true value of gas opacity is not known, it can be approximated by the use of an appropriate standard of reference. For example, a National Institute of Standard and Technology Standard (formerly NBS) Reference Material (NIST0-SRM) is a primary standard used to assess accuracy. Secondary standards are also used as an approximation to the "true value" although errors may be introduced using these secondary standards.

Angle of Projection - Refer to Attachment 1

Angle of View - Refer to Attachment 1

Audit - An audit is an independent assessment of the accuracy of data. Independence is achieved by having the audit performed by an operator other than the person conducting the routine measurements and by using audit standards and procedures different from those routinely used in the monitoring (see Systems Audit and Performance Audit in this section).

Audit Jig - A device when attached to the COMS transceiver allows the insertion of neutral density filters in the COMS light beam. The jig is used during the calibration error (CE) test of the COMS.

Attenuate - to lessen the amount, force, magnitude, or value of (light).

Attenuator - an apparatus used to lessen the amount, force, magnitude, or value of (light); another name for a neutral density filter or screen

Calibration Drift (CD) - The difference in the COMS output reading from a reference value after a period of operating during which no unscheduled

maintenance, repair, or adjustment took place. The reference value is supplied by a reflecting mirror and a neutral density filter or screen which can be automatically or manually inserted into the light beam path of the monitor. The CD error is calculated as the difference (in percent opacity) between the correct value and the observed value for the zero and upscale calibration value.

Calibration Error Test (CE) - A calibration error test is a performance audit of a COMS in which a three point audit is conducted. Three certified neutral density filters (low, mid, and high-range) are placed in the COMS light beam five nonconsecutive times and the monitor responses are recorded from the COMS data recorder. From the data, a calibration error is calculated.

Conditioning Period - Refer to Section 7.3

Continuous Emission Monitoring System (CEMS) - The total equipment required for the determination of effluent gas concentrations, flow or opacity on a continuos basis. Continuous opacity monitors may also be referred to by the acronym CEMS.

Continuous Opacity Monitor (COM) - That portion of the instrument that senses the pollutant and generates an output that is a function of the opacity (the transceiver and the retro reflector units). A COM is also known as a transmissometer.

Continuous Opacity Monitoring System (COMS) - The total equipment used to sample, analyze, and provide a permanent record of opacity monitoring data on a continuos basis. This equipment includes the transceiver, retro reflector, blowers, control unit, and data record and processing hardware and software. A COMS may also be known as a transmissometer system.

Data Recorder/Data Acquisition and Handling System (DAHS) - Refer to Attachment 1.

Effluent/Effluent Gas - The gas produced as a result of combustion or some other industrial process. The gas may be made up of multiple components such as particulate matter, liquids, condensed solids, vapors, and gases. The effluent gas may also be referred to as: stack gas, flue gas, duct gas or smoke.

Mean Spectral Response - Refer to Attachment 1

Monitor Malfunction - Any interruption in the collection of data as a result of the failure of any component of the COMS to operate within specifications of the manufacturer or Performance Specification 1 (PS-1).

Neutral Density (ND) Filter - An optical filter or screen which attenuates light uniformly over the wavelength range of interest. The wavelength range of interest for COMS is the visible light spectrum of 400 to 700 nanometers (nm). ND filters are used for the assessment of calibration error and are used for the assessment of the daily calibration drift (upscale calibration check or span check). ND filters may also be referred to as screens, attenuators, or audit filters.

Operational Test Period - Refer to Attachment 1

Opacity - Refer to Section 1.3

Optical Density - Refer to Attachment 1 and Section 1.6

Out-Of-Control Period - The time period which the COMS may not be collecting valid data; or data which may not be used to demonstrate compliance.

Path Length - Refer to Attachment 1, Section 4.2.

Peak Spectral Response - Refer to Attachment 1.

Performance Audit - A quantitative evaluation of COMS operation (refer to Audit in this Section and in Section 4.3.1). Usually the accuracy of the COMS is determined by using known reference standard (ND Filters).

Response Time - Refer to Attachment 1, Section 2.1.5 and Section 7.1.5

Routine Maintenance - An orderly program of actions designed to prevent the failure of monitoring parts and systems during their use.

(Daily) Span - Refer to Upscale Calibration Value in this section.

Span Value - Refer to Attachment 1. For most COMS, the span value is set to 100% opacity however, the span value may also be specified by regulations at a value other than 100%. Sometimes the Span Value is referred to as the range of the monitor.

Systems Audit - A qualitative evaluation of COMS Operation. Emissions data, logs, QA/QC data and the operational information are reviewed by regulator officials or by a corporate environmental auditor in order to determine the operational status of the COMS relative to the applicable regulations or to the company's objectives (refer to Section 4.3.2).

Transmissometer - Refer to COM or COMS in this section.

Upscale Calibration Value - Sometimes referred to as the span or daily span. The opacity value at which a calibration check of the COMS is performed by simulating an upscale opacity condition. The upscale calibration value is simulated with a filter or screen. Refer to Calibration Drift in Attachment 1.

Zero - A simulated or actual level where the opacity is at zero (0) percent. A simulated zero is initiated daily when a mirror in the transceiver unit moves into the light path. An actual zero may be performed when the COMS is mounted on the stack and no emissions are in the stack or duct (clean stack conditions) or by removing the COMS (transceiver and retro reflector) from the stack to achieve the actual zero. Also refer to Zero Drift in Attachment 1.

Visible Emission Observations (VEO) - Quantifying the opacity of an effluent gas using the EPA Reference Method 9.

1.3 Opacity and Transmittance

A plume of smoke is judged to be 100 percent (%) opaque if light cannot penetrate through the plume. If the plume is 100% opaque, it is said to have 0% transmittance. Most plumes are neither 0% nor 100% opaque but are somewhere in between. Depending upon the source category, or permit conditions, federal or state standards will usually range from 10% to 40% opacity.

Percent transmittance, percent opacity, transmittance and opacity are related by the following equations:

Equation 1a: Transmittance expressed as a percentage.

% Transmittance = 100 - % Opacity (%T = 100% - %Op)

Equation 1b: Transmittance expressed as a fraction.

Transmittance = 1.0 - Opacity (Tr = 1.0 - Op)

The data generated by a COMS should correlate with EPA Reference Method 9, Visible Determination of the Opacity of Emissions From Stationary Sources. Consequently, the light source that a COMS uses must be in the visible (photopic) light spectrum of 400 - 700 nm. The Reference Method 9 procedure may be found in 40 CFR Part 60, Appendix A and in EPA Quality Assurance Handbook for Air Pollutant Measurement Systems, Volume III Stationary Source Specific Methods. Refer to Section 2.5 of this chapter for procedures for the comparison of VEO and COMS data.

1.4 General COMS Design

A COMS is made up of the transceiver, retro reflector, air purging system (blowers), shutters, zero/span calibration unit, control unit, and Data Acquisition and Handling System (DAHS). In the basic COMS system, a light source in the transceiver projects light beams through the effluent gas in the stack or duct. A retro-reflector, opposite to the transceiver, reflects the light back through the effluent gas to the transceiver. Thus, the light beam makes two passes or "double-pass" through the effluent gas.

The reflected light beam is measured by a detector in the transceiver. The detector determined the amount of light remaining after attenuation by the effluent gas (I). Prior to passing through the effluent gas, the light beam is split (beam splitter) in the transceiver so that a reference measurement (Io) can be taken.

The optical system of a COMS is designed so that the transmittance of light is determined from a reference measurement of light intensity, Io, and, from the intensity of the light after it passes through the effluent gas I. The ratio of the two intensities, I/Io is the fraction of the transmittance as calculated in equation 2. This measurement and calculation I the primary output of the COMS.

Equation 2: Tr = I/Io

Light transmittance from the effluent gas (Tr) signal is sent to the COMS's control unit where a percent opacity (see Equations 1a and 1b) is calculated and displayed on the front panel meter. The control unit is also connected to

some type of DAHS so that a permanent record of the opacity readings can be made. A typical DAHS consists of a computer or data logger.

Located inside the transceiver is a calibration system for simulating a zero value and an upscale opacity value. A mirror (zero reflector) is moved into the light beam path using a small electric motor. This mirror gives a simulated zero reading for the monitor. When the mirror is in this position, an upscale calibration Attenuator (neutral density filter or screen) can also be moved in place. This attenuator produced an upscale opacity reading (upscale opacity value) which checking the system according to EPA performance specifications. The zero reflector is located outside the window that protects the transceiver from the effluent gas. If particulate matter adheres to the window, the monitor will no longer read zero when the mirror is put into position. Instead, an upscale reading will be generated by the "dirty window". Performance Specification 1 allows for up to a 4% opacity correction for "dirty windows".

Also included in the COMS is a blower or air purging system which keeps the windows clean. Without these blowers, the windows would become "dirty" from the effluent gas particulate and could lead to erroneous high opacity readings. In case of blower failure, shutters are used to protect the windows from the usually corrosive effluent gas.

Located on the transceiver is an alignment sight or "bulls-eye" which allows the operator to check for proper alignment of the transceiver with the retro reflector. Using this "bulls-eye" sight and making adjustments to the monitor's mountings allows the COMS owner or operator to maintain correct alignment.

While the transceiver, retro reflector, blowers, and zero/span calibration unit are mounted on the stack or duct, the control unit and the DAHS are usually in a control room or instrument shelter. Features contained on most COMS control units include various fault lights and zero/span remote activation controls. Fault lamps, when lighted, indicate problems with blower, shutters, and light sources (for more information refer to Section 4.2.2, Checking Fault Lamps and the COMS manufacturer's operational manual).

1.5 Single Pass COMS

A single-pass COMS consists of a light source mounted on one side of a stack and a detector mounted on the opposite side of a stack. Light makes only a single pass through the effluent gas as compared to the double pass system where light makes two passes.

1.6 Optical Density

Optical Density (OD) is the logarithmic measure of the amount of incident light attenuated. Optical Density is used to calculate the following expressions: the stack exit correlation, output readings from span filters, combiner equations, and opacity-mass correlations.

Equation 3a: $\text{Optical Density} = \text{Log}_{10}[1/(1-\text{Opacity})]$

$\text{OD} = \text{Log}_{10}[1/1-\text{Op})]$

Equation 3b: $\text{Optical Density} = \text{Log}_{10}\ 1/\text{Transmittance}$

$\text{OP} = \text{Log}_{10}[1/\text{Tr}]$

Example Calculation using Equation 3:
%OP = 25%
Op = .25 (in fractional terms)
OD = Log_{10} 1/(1-.25)
OD = Log 1/.75 = Log 1.33
For an Opacity of 25% the Optical Density = .1249

1.7 Stack Exit Correlation Factor

The stack exit correlation factor is used to relate the EPA Reference Method 9, Visible Observation of Emissions, to the data from the COMS. Performance Specification 1, 40 CFR Part 60, Appendix B requires that opacity readings at the COMS location be corrected to the opacity at the stack exit. Most COMS automatically correct data to exit opacity values.

The stack exit correlation factor (SECF) is also known as the optical pathlength correction ration (OPLR) or Stack Taper Ration (STR). Refer to the COMS operating manual for the exact terminology used by the manufacturer. The stack exit correlation factor is a constant number and usually must be set in the COMS (control unit) when it is installed at the source and must be checked quarterly at the time of the performance audit. (See Section 4.3.1)

Note: Changing the monitors stack exit correlation factor will cause changes in the opacity readings and may invalidate the COMS certification. The stack exit correlation factor must not be changed unless the monitor path length or the exit path length of the stack changes.

The percent opacity of the effluent gas will be affected at the stack exit if the diameter of the stack differs from the COMS pathlength. The relationship between the two distances can be expressed by the following equation (for a double pass COMS).

Equation 4a: $Od_x = (L_x/2L_t)OD_t$

Where:

OD_x = Optical Density at the stack exit
OD_t = Optical Density at the COMS location
L_x = the pathlength at the stack exit
L_t = the pathlength at the COMS location

Some COMS manufacturers may not use Equation 4a for calculating OD_x. COMS manufacturers may use equation 4b when calculating the stack exit optical density and % opacity. Refer to the COMS operating manual for the equation used to calculate the stack exit correlation factor.

Equation 4b: $ODx = (L_x/L_t)OD_t$

1.8 Selection of Attenuators

1.8.1 Introduction

The required opacity value or optical density of attenuators (filters) depends upon how the attenuator will be used with the COMS. The three basic uses for attenuators on a COMS are:

1. upscale calibration check (daily span)
2. calibration error test in COMS certification (PS-1)and,
3. calibration drift assessment (326 IAC 3-5-5 Quality assurance requirements).

1.8.2 Upscale Calibration Attenuators

As stated in PS-1, the upscale calibration attenuator should produce an opacity value (corrected for path length, if necessary) that is greater than or equal to the applicable opacity standard but less than or equal to one-half the applicable instrument span value. For example, if a source has an opacity limit of 40% and a monitor with a span of 100% opacity, then the daily upscale calibration attenuator (daily span filter) should be between 40% and 50% opacity.

1.8.3 Calibration Error Test Attenuator Selection

As a part of COMS certification, PS-1 requires that a calibration error test be performed in which three attenuators are used. PS-1 requires that the selection of the calibration attenuators be based on the COMS span value (specified in the applicable subpart). PS-1 provides information for calculation and selecting the path corrected low, mid, and high-range attenuator optical densities and percent opacities. For example, if span value = 100%, monitor path length (L1)= 10 feet, emission outlet path length (L2) = 5 feet than the required calibration attenuator values (nominal) should be the following:

Attenuator Range	Desired Monitor Output % Opacity (Optical Density) D_1	Required Attenuator % Opacity (Optical Density) D_2
Low	20.6(0.1)	36.9(0.20)
Mid	60.2(0.4)	84.2(0.80)
High	87.4(0.9)	98.4(1.80)

Equation 5: $D_1 = D_2(L_1/L_2)$

Note: $L_1 = L_t$ and $L_2 = L_x$. See equations 4a and 4b

1.8.4 Calibration Drift Assessment Attenuator Selection

Refer to PS-1 requirements for attenuator selection.

2.0 **COMS DESIGN, PERFORMANCE AND CERTIFICATION REQUIREMENTS**

2.1 Introduction

In order to obtain a certification from IDEM, a COMS must meet the design and location specifications of PS-1 and demonstrate through extensive testing, conformance with performance test specifications. Upon review of the certification data submitted by the COMS owner/operator which demonstrates adequate COM design, installation, and performance, IDEM OAQ will issue a letter to the COMS owner/operator that certifies the COMS. After a COMS owner/operator has received a certification letter from IDEM, OAQ, the data generated by the COMS may be used to demonstrate compliance with the applicable emission standard.

2.2 Performance Specification 1 (PS-1)

The Code of Federal Regulations (40 CFR part 60, Appendix B, Performance Specification 1), outlines the design specifications, installation, and performance requirements, preliminary test, and adjustments as well as field tests for COMS. PS-1 is included as Attachment 1.

2.3 Indiana Certification Requirements

All COMS used to meet the regulatory monitoring requirements of federal, state, and local agency entities must adhere to the following certification requirements:

1. Submit the proposed monitor location for review to the IDEM, OAQ, CDS at least 35 days prior to the COMS installation.
2. Install each COMS as per the manufacturers/contractors recommendations and meet the requirements of PS-1 and if applicable any permit or agreed order conditions.
3. Perform the certification testing according to PS-1
4. Submit the manufacturer's performance certification data (as per PS-1) and the certification test data to IDEM, OAQ, CDS within 45 days of the completion of the certification test.

If the certification test meets the PS-1 requirements, a letter will be issued to the company/source by the IDEM indicating that the COMS is certified. The date of the letter is considered the official certification date.

2.4 Recertification Requirements

The certification procedure ensures that a specific COMS at a specific location and, within a certain range of process conditions, will provide representative measurements of a source's emissions. When the monitor, it’s location, or the process(es) are substantially altered, the COMS may no longer be making measurements which are representative of true stack exit opacity.

A modification of the monitor, a modification of its location, or a change in the process producing the gas effluent may affect the certification of the COMS. IDEM must evaluate each situation in order to determine if a recertification is necessary. The following are some events that would require recertification.

1. **Event:** Moving a certified COMS to another location on the stack or duct. **Recertification Action Required:** (a) the new location must be submitted to IDEM for review and approval. (b) Perform the 168 hour operational test (c) Submit the results of the test to the IDEM for review within 45 days after the completion of the test. (d) After review of a satisfactory recertification test, the source will receive a certification letter from the IDEM.

2. **Event:** Switching two or more certified COMS with each other's location.
   Recertification Action Required: (a) if all the COMS were previously at approved certified locations then recertification would consist of repeating the activities for 1(b) through 1(d).

3. **Event:** Replacing or switching a major component of the COMS such as the transceiver, the retro reflector, or the control unit. All COMS components must be certified as a system, so when any component is replaced the entire system must be recertified.
   Recertification Action Required: After the major component has been replaced, the manufacturer must recertify that the COMS meets the design specifications of PS-1. If the COMS was at an approved location then the recertification would consist of repeating the activities for 1(b) through 1(d).

4. **Event:** A major overhaul or reconditioning of the COMS. If the majority of the electronic and mechanical components of the COMS are repaired, replaced or reconditioned (as per manufacturer's recommendations).
   Recertification Action Required: Each event would be considered on a case by case basis. Please contact IDEM, OAQ regarding certification requirements before undertaking any major repairs.

All possible recertification events cannot be listed. It is strongly recommended that the source contact IDEM, OAQ if there is any question regarding recertification. Please keep in mind, a recertification which involved performing the operational test may be easily performed by the source owner/operator. This test involves documenting the daily zero and span drift over 168 hours (7 days) and sending the results to the IDEM. Refer to PS-1 for the exact procedure. If the COMS passes this test, opacity monitoring data collected during the testing period is considered valid.

The following events would not require recertification:

1. Any routine maintenance as per the manufacturer's recommendations. Common maintenance items include but are not limited to :
   a. cleaning of the optical windows,
   b. replacement of blower motors or blower filters with factory approved parts,
   c. replacement of the light source with a factory approved part,
   d. alignment of the transceiver with the retro reflector,
   e. adjustment of the zero or span values,
2. Repair or replacement of the zero mirror, the span filter, and /or the mirrors used to initiate the zero/span sequence.
3. Removal of the COMs from the monitoring location and reinstallation of the same COMS.
4. Repair or replacement of any portion or all of the DAHS.

5. Turning off and then back on the COMS for any length of time due to a process or plant shut down period.

2.5 Correlation Between COMS Data and Method 9 (VE).

The design, installation and performance requirements of PS-1 ensure that a specific COMS installed at a specific location will most likely provide data which is representative of effluent gas opacity. However, after the COMS has been operated over a period of time, conditions may occur which might bring into question the accuracy of the data. Conditions such as a change in the effluent gas due to a change in the manufacturing process might bias the COMS data (either high or low). If the COMS is suspected of not producing accurate data or the COMS does not met the minimum distance requirements of PS-1, IDEM may require a source to conduct a visible emissions correlation.

The basic guidelines for the correlation are:

1. The source must operate so that 6-minute average opacity readings are at or near their limit under 326 IAC 5 and/or 40 CFR Part 60.
2. Two certified Visible Emissions (VE) readers (at least one of which must be from IDEM) must be present to conduct the correlation. The source may opt to use their own staff, or hire a consultant to perform the correlation.
3. The monitored process(es) must be operating greater than 75% of the permitted capacity for the duration of the correlation.
4. The source must conduct a manual calibration of the COMS prior to the beginning of the correlation. If the COMS fails the manual calibration, corrective action must be taken before the correlation can proceed. If the COMS cannot be repaired, the correlation must be rescheduled.
5. The correlation period must consist of the following:
   VE versus COMS
   a. one six-minute test at normal plant operation, with sootblowing, ash pulling, ramping or other means to vary emissions during the test;
   b. one thirty-minute test below the opacity standard (within 10% opacity below the standard);
   c. one thirty-minute test above the opacity standard (within 10% opacity above the standard).

   COMS versus COMS (reference 40 CFR part 60, Appendix B, PS-1)
   a. a two-hour test with soot blowing, ash pulling, ramping, or other means to very emissions to allow monitoring at or above the source's opacity standard.

6. After the entire correlation is completed conduct another manual calibration of the COMS. If the monitor does not meet the calibration specifications, the necessary corrective action must be taken and the correlation test must be repeated. If the COMS meets the calibration specifications, obtain copies of the COMS strip chart or DAHS data of the percent opacity 6-minute averages as well as the process data for the correlation period.
7. Standards: For VE versus COMS, the relative accuracy must be less than or equal to ($\leq$) 20%. This relative accuracy standard is based on the absolute value of the mean difference between each pair of readings (VE and COMS), a 2.5% confidence coefficient, and the average of the standard readings (VE) or applicable limit. For COMS versus COMS, for one COMS at an approved location and the other COMS at an alternate location, two standard apply:

a. the average difference between the two monitor's readings for a 2- hour period must be less than (<) 10% of the average reference value. For example, if the average 2-hour opacity from the approved COMS (reference) is 35% and the opacity from the alternate location COMS is 32% then 10% of the reference equals 3.5% opacity; the difference between the reference and the alternative is 3.0%, therefore the alternate passes the correlation test.
b. The difference between the average reference and the alternate readings must be $\leq$2.0% opacity. For example, the alternate COMS from the above example does not meet this standard 7b, however, it still passes because the COMS meets the 7a standard.

8. IDEM will complete the calculations and forward the final results to the source as soon as possible.

3.0 QUALITY ASSURANCE PLAN REQUIREMENTS

3.1 Introduction

A Quality Assurance (QA) program is a management system which ensures that Quality Control (QC) activities, such as preventive maintenance, daily calibrations and quarterly audits are performed. QC activities certify that generated data is complete, representative, accurate, and precise. The Quality Assurance Plan, also know as the Standard Operating Procedures (SOPs) is the formalized written document of the QC program activities.

The QA program, as specified by the QA plan, is the basis for assessing and maintaining the quality of continuous emissions monitoring data. A QA program has two distinct and equally important functions. These functions are:

- The assessment of the quality of the data (accuracy and precision), and
- The quality control, which involves activities used to maintain or improve data quality.

The above two functions form a control loop. When the assessment function indicates that data quality is inadequate, the quality control function must be increased until data quality is acceptable. The quality (and quantity) of valid data dictates the amount or degree of QC to be used in the monitoring program.

The QA plan must provide detailed written descriptions of all current QC activities. When updates or changes to any activities are necessary to the QA plan, the plan must be revised to reflect those changes.

In the Plan, the company or plant should state its philosophy and approach to its QA program. Also, the procedures used to set up the QC program must be stated as a clearly defined set of activities. These activities, or SOPs, must be incorporated into the QA plan. SOPs provide monitor descriptions, company QA policies, monitor system QC procedures and audit procedures.

A well written QA plan, along with the manufacturer's equipment operating manuals, provides the COMS operator with most of the necessary information for proper monitor operation, maintenance and QC. Additional information such as the plant personnel's experiences with the system should also be incorporated into the Plan. The QA plan is a valuable tool for the evaluation and improvement of the monitoring system by the source and regulatory personnel.

The QA plan should be reviewed by company personnel at least yearly and revised as necessary to improve monitor operations. It must also be updated to meet any changes in state and federal guidelines. The original QA plan and any revisions to it must be submitted to the IDEM, OAQ for review and approval as required by IAC 326 3-5-4, Standard operating procedures (see Section 1.1 for the IDEM mailing address and phone number and see attachment 4 for the Standard operating procedures rule).

When a company's COMS is evaluated (see Section 4.3.2 of this chapter), IDEM uses the company's QA plan as the basis for the evaluation. Therefore, it is extremely important that the QA plan state the QA/QC activities a company is actually performing, not the QA/QC activities which should be performed.

It is worth noting, a SOP is actually part of a QA Plan. However, state and federal regulations only make reference to the SOP requirements. QA and QC functions included in these state and federal regulations define the SOP. In practical terns, "SOP" and "QA Plan" can be used interchangeably.

3.2 Required Elements

The owner or operator of each affected facility operating a COMS is required to submit to IDEM complete written continuous emission monitoring standard operating procedures (SOP) within ninety (90) days after monitor installation. The required elements for SOPs are specified in state rule 326 IAC 3-5-4 Standard Operating Procedures. See attachment #2 of this chapter for the entire rule.

At a **minimum**, the SOPs must describe **complete step by step** procedures and operations as follows:

(1) A description of the facility monitored.
(2) A listing of the following:
    (A) Each monitor's brand.
    (B) Model number.
    (C) Serial number.
    (D) Monitoring location.
    (E) Data handling and acquisition system
(3) Examples of all reporting and log forms.
(4) Record keeping and reporting procedures that include the following:
    (A) Reporting of instrument precision and accuracy.
    (B) Reporting of emissions data.
(5) Methods and procedures for analysis and data acquisition.
(6) Calibration procedures that include the following
    (A) Calibration error limits and linearity.
    (B) Calibration gas type as applicable, quality, and traceability to the National Institute of Standards and Technology.
    (C) Calibration frequency
    (D) Criteria for recalibration, and analysis procedures to periodically verify the accuracy of span and calibration standards.
(7) Operation procedures that include daily procedures, quantifying and recording daily zero (0) and high level drift that meet the requirements of 40 CFR 60, Appendix B, Performance Specification 2, or other applicable requirements, and other operating parameter checks indicating correct operational status.
(8) Quality control and quality assurance procedures that include the following:
    (A) A statement of quality policy and objectives.
    (B) Organization and responsibilities description.
    (C) Calibration and span and zero (0) drift criteria.
    (D) Excessive drift criteria.
    (E) Corrective action for excessive drift.
    (F) Precision and accuracy results.
    (G) Corrective action for accuracy audit failures.
    (H) Data validity criteria.
    (I) Participation in department performance audits (if performed).
    (J) Data recording and calculation audits.
(9) Preventive maintenance procedures and corrective maintenance procedures that include those procedures taken to ensure continuous operation and to minimize malfunctions.

10) A listing of the manufacturer's recommended spare parts inventory.

3.3 Additional Elements

The source owners or operators of COMS are encouraged to develop and implement a more extensive QA/AC program than required by 325 IAC 3-5-4. Additional elements which could be included in a QA plan are:

- A document control system which states how the plan and it's revisions are to be distributed. Each page of the plan should be dated, numbered, and marked with a revision number (i.e., similar to each page of this chapter).
- A list of all applicable local, state, and federal COMS requirements (rules and regulations).
- A copy of the operating permit.

3.4 Submission of the Plan and Biannual Review

Indiana rule 326 IAC 3-5-4 requires the owner or operator of each affected facility operating a COMS to submit to IDEM complete written continuous emission monitoring standard operating procedures (SOP) within ninety (90) days after monitor installation. In addition, any revisions to the SOP must be submitted to IDEM biennially (once every two years). It is recommended that the company conduct an annual review of their QA plan and update it as necessary.

Whenever excessive data loss (for any reason) occurs, the company/plant should perform a systems audit (see Section 4.3.2 of this chapter), review their QA plan, and make any appropriate revisions in QC and operational procedures.

3.5 Example QA Plan

An example QA plan is available to any company that owns or operates COMS in Indiana. Please make the request to the Compliance Data Section (see Section 1.1 for the address and phone number). The example plan has all the basic elements that comprise an acceptable QA/QC plan and may be used as a guide for the writing of a QAS plan specific to a source.

Because quality control activities encompass a variety of policies, specifications, standards and corrective measures, this example QA plan treats QC requirements in general terms. Each owner or operator is encouraged to develop and implement a QA plan that is effective, efficient and reflective of their COMS program.

4.0 QUALITY CONTROL AND QUALITY ASSURANCE REQUIREMENTS

4.1 Introduction

Quality Control activities are generally performed on a routine basis by the COMS operator or are automatically initiated by the COMS. In either case, the operator or a designated individual must promptly review the results of all QC checks and take appropriate follow up actions to correct any problems. Quality assurance requirements for COMS are specified in Indiana rule 326 IAC 5-5-5 Quality Assurance requirements Sec.5.(b) and are provided in attachment 4 of this chapter. These requirements are explained further in the following sections.

4.2 Daily Checks

4.2.1 Calibration Drift (zero and Span)

The COMS must be checked at least daily and the Calibration Drift (CD) quantified and recorded at zero and an upscale-level opacity. The COMS must be adjusted whenever the CD exceeds the specification of PS-1, and the COMS shall be declared "out-of-control" when the CD exceeds twice the specification of PS-1. (See attachment #1 of this chapter).

Most COMS are designed to provide for an automatic initiation of the CD check (also called the zero and span check). This check may also be manually initiated at the control unit or transceiver location on many types of monitors. A manual or computerized record (log) of the CD must be maintained. An example of a daily log sheet is located near the end of this chapter (form 1)

Many DAHS will automatically calculate the CD before the COMS self-adjusts for any drift within preset limits. A fault lamp or an alarm will activate if the CD exceeds the PS-1 limits. True opacity is the opacity of the upscale calibration filter or screen as set/determined by the manufacturer. To manually calculate CD, use the following equation:

Equation 6:

Calibration Drift in % Opacity = True % Opacity - Observed % Opacity

$$CD = \%\ Op_{final} - \%\ Op_{initial}$$

Example calculations using Equation 6

	Zero % Opacity			Upscale Calibration % Opacity			
Day	Initial A	Final B	Drift C=B-A	Initial D	Final E	Upscale Drift F=E-D	Cal Drift G=F-C
0	-	1.2	-	-	45.0	-	-
1	1.2	1.1	-.01	45.0	46.2	1.2	1.3
2	1.1	0.9	-.02	46.2	45.2	-1.0	-1.2

4.2.2 Fault Indicators Assessment

Indiana rule 326 IAC 3.5.5, Sec 5.(b),(2) requires that fault lamp indicators, the DAHS, and any other self diagnostic indicators to be checked at least daily. Appropriate corrective actions must be taken when the COMS is operating outside preset limits. The results of these daily checks should be recorded in a daily or weekly log. An example of a daily log sheet is located near the end of this chapter (Form 1).

4.2.3 Other Checks (Daily, Weekly, Monthly)

Other frequent checks (operational or preventive maintenance) may be required depending on the COMS manufacturer's instructions and the operator's experience with the monitor. Include all additional checks on a daily/weekly/monthly log. A useful way to chart the type and frequency of checks is to make an activity matrix. An example matrix of this type is located near the end of this chapter (Form 2).

4.3 Performance and System Audit Requirements (Periodic Checks)

4.3.1 Performance Audit

A performance audit checks all of the individual COMS components and factors which affect the accuracy of the monitoring data. Indiana rule 326 IAC 3-5-5 Quality assurance requirements, Sec. 5. (c),(3) specifies the required elements of a performance audit. A copy of this rule is located in Attachment #2 at the end of this chapter. At a minimum, at least once each calendar quarter, the following performance audit elements must be performed:

4.3.1.1 Optical Alignment Assessment

The status of the optical alignment of the monitor components shall be checked and recorded according to the procedure specified by the monitor manufacturer. Monitor components must be realigned as necessary.

4.3.1.2 Optical Surface Dust Accumulation Assessment

The apparent effluent opacity shall be compared and recorded before and after cleaning each of the exposed optical surfaces. The total optical surface dust accumulation shall be determined by summing the apparent reductions in performing this check since fluctuations in effluent opacity occurring during the cleaning cycle may adversely affect the results.

4.3.1.3 Zero and Upscale Response Assessment

The zero and upscale response errors shall be determined and recorded according to the CD procedures. The errors are defined as the difference (in percent opacity) between the correct value and the observed value for the zero and high-level calibration checks.

4.3.1.4 Zero Compensation Assessment

The value of the zero compensation applied at the time for the audit shall be calculated as equivalent opacity. Corrected to stack exit conditions, according to the procedures specified by the manufacturer. The compensation applied to the effluent recorded by the monitor system shall be recorded.

4.3.1.5 Optical Pathlength Correction Ratio (OPLR) or Stack Exit Correlation Error Assessment

The optical pathlength correction ratio (OPLR) shall be computed from the monitor pathlength and stack exit diameter and shall be compared, and the difference recorded, to the monitor setup value. The stack exit correlation error shall be determined as the absolute value of the difference between the measured value and the correct value, expressed as a percentage of the correct value.

4.3.1.6 Calibration Error Assessment

A minimum of three (3) attenuators (filters), meeting the requirements of PS-1 must be placed in the COMS light beam path five (5) nonconsecutive times for each filter (a total of 15 readings). The monitor responses in percent opacity must be independently recorded from the COMS permanent data recorder. The low-, mid-, and high-range calibration error results must be computed as the mean difference and 95 percent confidence interval, for the difference between the expected and actual responses of the monitor, as corrected to stack exit conditions. These values must be calculated using the procedures of Sin PS-1. The following equations are used to calculate calibration error:

Equation 7: Difference between the True % Opacity of the filter and the Observed % Opacity of the monitor response. Because each filter is inserted into the COMS light path five times, a total of fifteen readings must be calculated.

$$X_i = \text{True \%Opacity} - \text{Observed \% Opacity}$$

The following equations are located in Attachment 1 (PS-1).

Equation 8: Arithmetic mean, $(\bar{X})$, of the differences. Calculate the mean (average) for each data set (3 sets) of the five readings. Use equation 1-2.

Equation 9: Standard Deviation, (Sd). Calculate the standard deviation for each set of five runs. Use equation 1-3

Equation 10: Confidence Coefficient (CC). Calculate the 2.5 percent error confidence coefficient (one-tailed test using the t-table) for each of the three filter runs. Use equation 1-4.

Equation 11: Calibration error, (CE). Calculate the calibration error for each of the three filter runs. Use equation 1.5.

The calibration error must be less than or equal to three percent ($CE \leq 3\%$). If this limit is exceeded for any of the three (3) audit filters then corrective action must be performed on the COMS and the audit must be repeated. The COMS is considered to be "out of control" and all data generated after the completion of the audit is suspect. Suspect data may or may not be used for compliance purposes or valid data calculations. Source should submit all data used to determine compliance with their standard. Sources should also submit an information (daily or weekly logs, maintenance reports, etc.) which might prove or disprove the out-of-control condition of the COMS. IDEM will make the final determination of the data's validity. Following any repair/maintenance of the COMS and the completion of a CE meeting the limit

(≤3%), the out-of-control period ends, and the COMS data is no longer considered suspect.

Detailed audit procedures and field data forms for many COMS brand and models are found in the EPA Technical Assistance Document (TAD) "Performance Audit Procedures for Opacity Monitors", March 1992. Keep in mind that COMS methodology is continually being updated as improvements to COMS are introduce by their manufacturers. Be sure to contact the COMS manufacturer for any information pertinent to a particulate monitor and it's audit procedures.

4.3.2 Systems Audit

Volume III of the EPA Quality Assurance Handbook for Air Pollution Measurement Systems defines a systems audit as "a systematic *qualitative* review of facilities, equipment, training, procedures, record keeping, validation, and reporting aspects of a total (quality assurance) system, to arrive at a measure of the capability and ability of the system". A systems audit may be conducted on a scheduled frequency by the source's environmental auditor. However, IDEM, OAQ may conduct a systems audit on any source which exhibits problems with producing data of sufficient quality and quantity to demonstrate compliance with the applicable standard. The Quality Assurance Plan is used as a guide for conducting a systems audit. The plant allows the auditor to determine if the source is following all QA/QC procedures specified in the plan and it also guides the auditor when reviewing the source's COMS operating logs, records, and data. In some cases a performance audit will also be conducted in conjunction with a systems audit.

4.4 Attenuator Certification Requirements

Neutral Density (ND) filters, used for calibration error assessment are required to be certified once per year. ND filters must be certified in accordance with the basic procedures specified in 40 CFR Part 60, Appendix B, PS-1.

The basic ND filter certification requirements are:

- The filter must be certified by a laboratory spectrophotometer meeting the minimum design specifications of: wavelength range of 300-800 nm; detector angle of view <10 degrees; and an accuracy of <.5% transmittance; and, NISP traceable calibration.
- The spectrophotometer calibration must be verified with NIST Standard Reference Materials (SRM).

4.5 Data Availability Requirements and Calculations

As the name states, a continuous opacity monitoring system is expected to produce opacity monitoring data **continuously** while the source is in operation. However, any monitor will have periods of downtime during which it will not be producing valid data. Short periods of missing data are expected and accounted for (not counted as missing data) when calculating monitor down-time. For example, calibrations and quarterly audits are not counted as missing data. Short periods of missing data might occur when performing preventative maintenance on the monitor(s).

Note: A six-minute average for percent opacity shall be considered valid if, at a minimum, 83% of the individual 10 second readings are made.

IDEM does not have a minimum valid data requirement for opacity data. Each source is expected to capture as much data as possible so that any potential excess emissions can be measured. Period of missing data and the reason must be included in the source's quarterly report to IDEM. IDEM evaluates each source with less than 100% valid data returned (VDR) and makes determinations on **a case by case basis** as to enforcement action(s).

A COMS which fails a daily calibration, quarterly audit, or any other QC check must be designated by the owner/operator as "out-of-control" and the problem must be corrected as soon as possible. Any data produced which the source deems questionable (not representative of the actual emissions) should be designated as such. The source must submit this data, along with the reasons for the data being suspect, to IDEM for review. IDEM will make the final determination as to the validity of all data.

Equation 12:

$$\% \text{ Monitor Down-Time} = \frac{(\text{Total Source Operating Hours} - \text{COMS Operating Hours})}{\text{Total Source Operating Hours}} \times 100$$

Example Calculation:

Total Source Operating Time = 1659.5 hours
COMS Operating Time = 1493.0 hours

% Monitor Down-time = [(1659.5-1430)/1659.5] X 100 = 13.8%

5.0 RECORD KEEPING AND REPORTING OF QUALITY ASSURANCE ACTIVITIES

5.1 Daily or Weekly Log Books and Check Sheets

A daily or weekly log for QC checks must be maintained for each COMS. This log helps to ensure that all daily and weekly maintenance and QC activities are performed. The log provides a permanent record for supervisors and for regulatory officials to verify that QC checks and routine maintenance were done on a specific date and time.

The results of the daily zero and span check and the status of the fault lamps must be recorded in the log. The log should be designed specific to each brand and model of COMS. Refer to the COMS operation manual of the items to include on the log. The operators experience should also dictate which items to include and the amount of detail to add to the log. The log can take any form, there is no requirement as to the exact organization of the daily log. All records related to COMS QA/QC and operation must be kept by the source and available for inspection for a minimum of 3 years. An example of a daily log is located near the end of this chapter (Form 1).

A bound numbered log book provides the most assurance that QC checks were performed daily, should the data ever be questioned. However, bound log books are not require so, many operators may elect to use a loose leaf or three-ring binder type of log book. The use of a DAHS for a log is also acceptable provided the DAHS can provide a record of all the data that would be recorded in a log book.

5.2 Quarterly Reporting

Indiana rule 326 IAC 3-5-5, Quality Assurance Requirements, Sec 5.(e)(1) (see attachment #2 in this chapter) requires each source operating a COMS to submit a written report to IDEM, OAQ within (30) days after the end of each calendar quarter. The report must contain the following:

1. The plant name and address
2. The monitor brand, mode, and serial number
3. The monitor location
4. The auditor's name
5. A copy of the audit standard's certification (i.e., neutral density filter's certification sheet).
6. The audit date and all data used to calculate the audit results.
7. An indication in the report if the monitor passed or failed the audit.
8. Any corrective actions as the result of a failed audit.

IDEM reviews all quarterly QA reports for completeness, correct use of equations, calculations, and audit results. A complete and descriptive audit report ensure that all concerned parties are adequately informed as to the operational status of the source's COMS.

Unless specifically instructed, sources are not required to submit to IDEM, OAQ the following: daily, weekly, or monthly operational logs, daily zero and span data, and routine maintenance information.

6.0 RECORD KEEPING AND REPORTING OF EXCESS EMISSIONS

6.1 Excess Emissions Reports (EER)

Quarterly excess emissions reports are required for sources which monitor opacity for compliance with an applicable rule or subpart. As the name implies, these reports are a summary of the instances in which the six-minute average opacity exceeds the limit of the source.

The Excess Emissions Report is a summary of three parameters:

a. **Facility Operating Time** may be reported as either the time in operation, or as the total process downtime.
b. **COMS Downtime** (due to malfunction, maintenance, and QA/QC activities) must be reported in real-time hours. During periods of malfunction, the cause of the malfunction and corrective action taken should be described. For other periods of invalid data (i.e., dirty window, object in light path etc.) the cause of the invalid data and corrective action taken should be reported.
c. **Six-minute averages in excess of the applicable opacity limit** must be reported in real-time hours. Each six-minute period, in excess of the limit, must be reported, as well as the cause of the exceedance. For continuous periods in excess (i.e., more than one six-minute average), report the start and end time of the exceedance, the cause of the exceedance, and the maximum six-minute average during the exceedance period.

In addition to the above information, a source must indicate the identification of the monitored facility (i.e., No. 6 Boiler) as well as the period of time covered in the EER (i.e., First quarter 2001).

The EER must be submitted to IDEM no later than thirty (30) days after the end of the quarter for reports due quarterly, and no later than fifteen (15) days after the end of the month for reports due monthly. These reports should be submitted to the Compliance Data Section of the IDEM, OAQ.

An example quarterly EER is available upon request to the Compliance Data Section of IDEM. The example EER is only a guideline and should be tailored to a source's individual monitoring needs. Form 3 of this chapter provides a template for a quarterly excess emissions summary report.

7.0 SUMMARY OF INDIANA COMS REQUIREMENTS

1. (Section 2.3) Submit the proposed COMS location to IDEM, OAQ for review and approval 35 days prior to installation.
2. (Section 2.3) Perform a certification test for each installed COMS meeting the requirements of 40 CFR Part 60, Appendix B, PS-1.
3. (Section 2.3) Submit the certification test data to IDEM, OAQ for review and approval within 45 days after the completed test.

Form 1 Daily Log

Coms location or unit No.	1st shift	2nd shift	3rd shift
1. General Information. Operators Name or Initials:	_____	_____	_____
Date:	_____	_____	_____
Time:	_____	_____	_____
2. Fault Lamp Status.	Off On	Off On	Off On
Integrated opacity high:	___ ___	___ ___	___ ___
Direct opacity high:	___ ___	___ ___	___ ___
Blower/purge fault:	___ ___	___ ___	___ ___
Dirty window:	___ ___	___ ___	___ ___
3. Zero Span Check Zero calibration value:	_____	_____	_____
Span calibration value:	_____	_____	_____
Window check value:	_____	_____	_____
Does zero or window value exceed the limit of 4.0 to 15.2 mA	_____	_____	_____
4. Chart Recorder Correct Date and Time:	_____	_____	_____
Pen Inking	_____	_____	_____
Paper Supply:	_____	_____	_____
5. Corrective Actions:	_____	_____	_____
Corrective Actions:	_____	_____	_____
Remarks:	_____	_____	_____

Form 2 - Activity Matrix

Activity	Frequency
1. Check the system, monitor operation, zero and span	Daily
2. Check the trace on the recorder	Daily
3. Change pen(s) and chart paper on the recorder	As required
4. Check the DAHS printer for paper and legible printing	Daily
5. Check for alarms and any malfunctions	Daily
6. Check air purge system on the COMS (blower motor, hoses)	Bi-weekly
7. Check alignment, light level, wiring, dirt build-up in front of the lens and reflector	Bi-weekly
8. Replace air purge system blower filters	Every 2 months
9. Replace blower motor, hose and light source	As required
10. Check current loop outputs	Every 6 months
11. Zero Monitor - Clear Stack Conditions	Once per year
12. Performance Audit including Calibration error (CE)	Each calendar quarter

Form 3 - Excess Emission Report

Emissions Data Summary	COM Performance Summary
1. Duration of excess emissions (in six minute averages) in reporting period due to:	1. COM down-time (in hours) reporting period due to:
Start-up/Shut-down _____	Monitor Equipment Malfunctions _____
Control Equipment Problems _____	Non-Monitor Equipment Malfunctions _____
Process Problems _____	Quality Assurance Calibrations _____
Other Known Causes _____	Other Known Causes _____
Unknown Causes _____	Unknown Causes _____
Total Duration of Excess Emissions _____	Total COM Down-Time _____

Attachment 1

40 CFR 60, Appendix B
PERFORMANCE SPECIFICATION 1

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL- 6846-6]

RIN 2060-AG22

Amendments to Standards of Performance for

New Stationary Sources; Monitoring Requirements

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The EPA is issuing revisions to the monitoring requirements to Performance Specification 1 (PS-1) of appendix B to part 60. The revisions clarify and update requirements for source owners and operators who must install and use continuous stack or duct opacity monitoring equipment. The revisions also update design and performance validation requirements for continuous opacity monitoring system (COMS) equipment in appendix B, PS-1. These revisions do not change an affected facility=s applicable emission standards or requirements to monitor opacity. However, the revisions do the following: clarify the obligations of owners, operators, and opacity monitor vendors; reaffirm and update COMS design and performance requirements by incorporating by reference American Society for Testing and Materials (ASTM) D 6216-98 (approved February 10, 1998); provide EPA and affected facilities with equipment assurances for carrying out effective monitoring.

DATES: This rule is effective [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Air Docket Section (MC-6102), Attention: Docket No. A-91-07, U. S. Environmental Protection Agency, Room M-1500, First Floor, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460.

Mr. Solomon Ricks, Source Characterization Group A, Emissions, Monitoring, and Analysis Division (MD-19), U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

FOR FURTHER INFORMATION CONTACT:

Mr. Solomon Ricks, (919) 541-5242.

Air Docket, (202) 260-7548.

SUPPLEMENTARY INFORMATION:

Docket, No. A-91-07, containing information relevant to this rulemaking, is available for public inspection between 8:00 a.m. and noon and 1:30 p.m. and 4:00 p.m., Monday through Friday, except for Federal holidays, at EPA's Air Docket Section. A reasonable fee may be charged for copying.

Overview. The preamble summarizes the legal authority for these revisions, background information, technical and economic methodology used by the Agency to develop these revisions, impacts of these revisions, regulatory implementation, responses to public comments, and the availability of supporting documents.

Regulated Entities. These revisions apply to certain facilities, and they may apply to others.

(a) The revisions apply to any facility that is:

(1) Required to install a new COMS, relocate an existing COMS, replace an existing COMS.

(2) Required to recertify an existing COMS that has undergone substantial refurbishing (in the opinion of the enforcing agency).

(3) Specifically required to recertify the COMS, as required in the Code of Federal Regulations (CFR).

(b) These requirements may also apply to stationary sources located in a State, District, Reservation, or Territory that has adopted these revisions into its implementation plan.

Background Documentation. The following is a list of background documents pertaining to this rulemaking:

(1) Summary of Comments and Responses to the Proposed Revisions to PS-1. July 1998. Docket item No. IV-A-01.

(2) Summary of Performance Specification 1 (PS-1) Stakeholder Meeting. June 1996. Docket item No. IV-E-01.

(3) Summary of Comments and Responses to the PS-1 Supplemental Proposal. April 1999. Docket item No. IV-A-02.

(4) The EPA Public Comment Meeting: Measurement Methods for Opacity Stack Monitoring. October 1998. Docket item No. IV-E-02.

The two Summary of Comments and Responses documents (items 1 and 3) for this final rule contain a summary of all public comments made on the rule and our response to the comments. The Summary of Performance Specification 1 (PS-1) Stakeholder Meeting (item 2) contains a brief summary of the meeting taken from a poor quality audio recording of the meeting. The EPA Public Comment Meeting: Measurement Methods for Opacity Stack Monitoring (item 4) contains a transcript of the public hearing on the Supplemental Proposal.

Technology Transfer Network. The Technology Transfer Network (TTN) is one of EPA=s electronic bulletin boards. The TTN provides information and technology exchange in various areas of air pollution control. New air regulations are posted on the TTN through the world wide web at: https://www3.epa.gov/ttn/atwfiles/area/facilities.html.

The information presented in this preamble is organized as follows:

1. Congressional Review Act

2. Executive Order 13084

I. BACKGROUND

We published the Specifications and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources, PS-1, (40 CFR Part 60 Appendix B) in the Federal Register on October 6, 1975 (40 FR 64250). We published an amendment to PS-1 on March 30, 1983 (48 FR 13322). Since the 1983 amendment, we gained more experience and understanding of COMS performance and operation. Also, manufacturers continued to improve the design of opacity monitors. In 1989 and 1990, we conducted opacity monitor manufacturer evaluations and found varying levels of sophistication in how manufacturers tested the performance of their monitors. For example, the detection limits of some testing equipment used by the manufacturers, were found to be limiting factors in evaluating COMS. In other cases, the evaluation showed that the COMS manufacturers had identified incorrect calculation procedures as well as inclusion of a component that caused an unacceptable COMS response. Other evaluations done in 1992 identified a continuing problem of clearly depicting misalignment of the transceiver and retroreflector. In 1992, we observed COMS responses over different distances for the COMS alignment test and concluded that the alignment check needed to be done at the installation pathlength. Moreover, from 1989 to 1992, we observed the angle of view (AOV) and angle of projection (AOP) testing, conducted by 10 major manufacturers of COMS, and concluded that the AOV and AOP should be reduced from the current 5 degrees to 4 degrees. This change reflects manufacturers' improvement in the monitors' capabilities. Lastly, the primary concern of COMS data users was the capability of the monitor to measure opacity accurately at or near the applicable standard. Once the opacity level exceeds the standard, the magnitude of the emissions is of lesser concern than the duration of the exceedance. Therefore, the levels at which the opacity monitor is evaluated needed to be revised. Based on the findings of our evaluations, we decided to update PS-1 to meet current industry practices and to ensure a continued improvement in the quality of opacity data.

II. REGULATORY HISTORY OF THIS RULEMAKING

We proposed revisions to PS-1 in the Federal Register (59 FR 60585) on November 25, 1994. Public comments were accepted for 60 days, until January 24, 1995. We received a total of 89 individual comments from 14 separate commenters. Comments on the November 1994 proposal revealed some concern and confusion with the design specifications and with the test procedures to verify compliance with the design specifications. A summary of the public comments and EPA=s response to those comments is in the docket (IV-A-01). To ensure adequate understanding of the technical issues uncovered in the comments, we held a public stakeholder meeting on June 12, 1996. Attendees included opacity monitor manufacturers, State and local agencies, EPA regional offices, and COMS owners and operators. A few of the monitor manufacturers were also members of ASTM. A summary of the stakeholder meeting is in the docket (IV-E-01). As an outcome of the stakeholder meeting, in September 1996, ASTM D22.03, a Subcommittee on Ambient Atmospheres and Source Emissions, volunteered to undertake development of a Standard Practice for opacity monitor manufacturers. The Standard Practice that they developed (1) offered additional design and performance specifications and test procedures to eliminate many of the performance problems that EPA encountered with existing COMS and (2) contributed to ensuring the quality of opacity monitoring results without restricting future technological development.

On September 23, 1998, we published a supplemental proposal in the Federal Register (63 FR 50824) to incorporate ASTM D 6216-98 by reference into the proposed revisions to PS-1. Public comments were accepted for 60 days. A total of 12 commenters responded to the supplemental proposal. A summary of the public comments and EPA=s response to those comments is in the docket (IV-A-02). On October 23, 1998, by request, we held a public hearing on the supplemental proposal. A summary of the public hearing is in the docket (IV-E-02).

III. MAJOR PUBLIC COMMENTS AND EPA RESPONSES AND CHANGES TO THE PROPOSED REVISIONS

A. Comments and Responses on the Proposed PS-1

We received a total of 89 individual comments from 14 separate commenters on the November 24, 1994, proposed revisions. The significant comments on the 1994 proposal came from manufacturers and focused primarily on the design specification and the verification test procedures. Specifically, one manufacturer stated PS-1

should include specifications for: (1) limiting the analyzer=s sensitivity to ambient light, (2) limiting the analyzer=s sensitivity to AC line voltage variations, (3) limiting the analyzer=s potential opacity error over the entire range of expected operating temperatures, and (4) describing the analyzer=s ability to meet some normal shock and vibration criteria. Another manufacturer stated a specification and verification test should be added to determine the homogeneity of the light beam. Several manufacturers suggested terminology was needed in PS-1 to distinguish between zero drift and dust accumulation on exposed optical surfaces. Another manufacturer described in detail the shortcomings of the angle of view and angle of projection verification procedures. Specifically, the manufacturer stated that the equipment being tested should incorporate whatever field restricting devices that will be installed with the transmissometer. He felt since most light sources are chopped to differentiate between ambient light and measurement light, it needs to be specified that the nondirectional light source may be chopped if required to be compatible with the light detection scheme. Also, since some chopping rates are so high as to only be feasible with light emitting diodes, it should be allowable to use the actual source, if necessary. If the actual source is used without projection optics, and it does not provide sufficient light at 3 meters to be detectable, a shorter distance should be allowed or use the normal projection optics, if required. Each of these issues is already addressed by the ASTM D 6216-98 Standard Practice. Therefore we adopted ASTM=s Standard Practice by reference into PS-1.

Several commenters requested that existing COMS that are moved or refurbished should not have to meet the requirements of this new PS-1. They argued that existing COMS would be required to have new span filters (in the PS-1 revisions, the term Aspan@ is no longer used; it has been replaced with upscale calibration value) installed and certified if relocated or refurbished. This issue was also raised in the comments on the supplemental proposal. The relocation of a COMS is likely to have an impact on the pathlength correction factor, which will impact the upscale calibration value. A change in the upscale calibration value could necessitate a change in the upscale calibration filter. The revisions to PS-1 ensure continued improvement in the quality of opacity data being collected, primarily due to the clarification of the design specification verification procedures and the performance specifications. The procedures are written in a manner to eliminate diverse interpretations. Therefore, we are requiring relocated or refurbished COMS to meet the new PS-1.

Many commenters suggested that the 20 percent dirty window compensation should not be allowed for any COMS. The commenters believed opacity monitor manufacturers are capable of utilizing improved purge systems to prevent dirt buildup. Also, it was suggested that errors of deliberate mis-adjustment or neglect of maintenance of

monitors could result. We agreed with the suggestion that deliberate mis-adjustment could occur, as well as neglect of maintenance of monitors, and the dirty window compensation is now 4 percent.

Several manufacturers commented that the calibration error test, instrument response time test, and optical alignment sight test should also be done by the manufacturer and not solely at the source by the owner or operator. Because the manufacturers have the special equipment to do these tests, we agreed that the calibration error, instrument response time, and optical alignment sight tests should be done by the manufacturer. In the supplemental proposal, we only required the manufacturers to perform the aforementioned tests. We received comments on the supplemental proposal from state regulatory agencies stating that facilities should continue to also be responsible for conducting these tests. One commenter argued that the burden on facilities would be minimal, because manufacturers representatives typically are directly involved with initial onsite installation and testing. The final rule requires both the manufacturers and facilities to perform the calibration error, instrument response time, and optical alignment sight tests. The final rule also requires the manufacturer to conduct performance verification tests on each monitor at installation-specific conditions or at clearly defined default conditions if installation conditions are not known.

B. Comments and Responses on the Supplemental Proposal

A total of 12 commenters submitted written comments about the September 23, 1998 supplemental proposal. Three people that spoke at the public hearing did not submit written comments. The most frequent comment concerned the manner in which we incorporated ASTM D 6216-98 by reference into PS-1. Representatives from ASTM believed incorporating D 6216-98 by citing the various paragraphs disrupted the flow of the Standard Practice. They felt it would be more advantageous if we incorporated the Standard Practice in its entirety. We agreed with this assessment; therefore, in this final rule, we have incorporated D 6216-98 in its entirety.

Both manufacturers and State agency representatives commented about the lack of field audit procedures to confirm the performance of the COMS after it was installed. They suggested we include the procedures that were in the 1994 PS-1 proposal (59 FR 60585) for the calibration error test, instrument response time test, and optical alignment sight test. Also, other commenters suggested that the field audit procedures should include a check of the

entire monitoring system to verify that the combined opacity monitor and data recording system correctly average and record averaging period values. We agreed that field audit procedures were necessary at the source, therefore we included field performance audit procedures and made them consistent with ASTM D 6216 in terms of both terminology and technology.

Many commenters expressed concern with the amount of time allowed for opacity monitor manufacturers to comply with the new specifications. They felt 30 days was not enough time. Several manufacturers suggested they could be in compliance within 180 days. We agreed with the suggested time for compliance and moved the effective date from 30 days to 180 days after publication in the Federal Register.

Some commenters questioned our replacing the old 168-hour Conditioning Period and 168-hour Operational Test Period with an extended 336-hour Operational Test Period. Commenters suggested making the Operational Test Period, during which the zero and upscale drift tests are conducted, consistent with the 7-day drift test period for a gaseous monitoring system. Also, a few commenters asked that normal source downtime be included in the Operational Test Period. Recognizing that source owners and operators would run informal conditioning period prior to beginning the operational test period, we eliminated the 168-hour Conditioning Period and reduced the Operational Test Period from 336 hours to 168 hours. We also clarified the language in the final rule and included minimum source operating times required during the Operational Test Period for batch operations and continuous operating processes.

Other commenters questioned our retaining the calibration stability test in PS-1 when tests were included in the ASTM Standard Practice to detect opacity monitors that have short-term drift problems. They believed including the test in PS-1 was redundant and unnecessary. We agreed with the suggestion that the test was redundant, and deleted the calibration stability test from the final rule.

One commenter stated that, as proposed, the requirements relating to daily zero and upscale calibration check levels would impose manufacturing problems which would significantly increase the cost to manufacture opacity monitors. This comment was given due to the manner in which ASTM D 6216-98 was incorporated in the supplemental proposal. The commenter stated that incorporating only certain sections of the standard created unnecessary confusion regarding the applicable requirements, allowed for mis-application of the ASTM standard, and created unnecessary complexity and significantly increased costs for regulatory agencies, instrument manufacturers, and the regulated facilities. Specifically, it was stated that to meet the values in the supplemental

proposal given for the zero and upscale calibration, a manufacturer would have to maintain 900 calibration filters. Although we did not agree with this interpretation of the rule, after reviewing the comments submitted on the supplemental proposal, we agreed that misunderstandings could occur with the rule as proposed. With the incorporation of the ASTM standard in its entirety, we have eliminated any confusion which may occur, and we have eliminated any unnecessary complexity in the rule. The final rule will not significantly increase the cost for regulatory agencies, instrument manufacturers, or the regulated facilities.

C. Applicability

The ASTM D22.03 Task Group chairperson indicated in his comments on the supplemental proposal that the calibration error specification of " 3 percent opacity, the zero and upscale drift specifications of "2 percent opacity, and the PS-1 requirements to adjust monitors when drift exceeds two times the specification (i.e., "4 percent opacity) are inappropriate for monitoring an opacity standard below 10 percent. Special calibration attenuators and calibration techniques, not yet available on a broad basis, are needed for cases where the opacity standard is below 10 percent. He noted that imprecision allowances of this magnitude create excessive uncertainty for establishing compliance with a low opacity limit. The ASTM representative noted that ASTM D 6216-98 specifications ensure accurate COMS measurements at sources with opacity standards of 10 percent opacity or greater.

The ASTM representative also indicated that the design specification for full scale to be set at 80 percent opacity or above is inappropriate for sources where the compliance level is below 10 percent opacity. The commenter also indicated other technical issues related to continuous monitoring of opacity from sources subject to opacity standards less than 10 percent which PS-1 does not adequately address. Therefore, the ASTM opacity Task Group elected to defer consideration of these special issues in ASTM D 6216-98 and instead specified that ASTM D 6216-98 will ensure that COMS Ameet minimum design and calibration requirements, necessary in part, for accurate opacity monitoring measurements in regulatory environmental monitoring applications subject to 10 percent or higher opacity standards.@

We recognize there are potential measurement errors associated with monitoring opacity in stacks especially for emission units subject to opacity limits less than 10 percent. The uncertainties in measurement

accuracy result from several factors. One is the current unavailability of calibration attenuators for opacity levels below 6 percent (3 percent for single-pass instruments). There are experimental techniques under review that would allow preparation and validation of calibration attenuators at levels down to 1 or 2 percent; however, the process for manufacturing and validating such devices is not yet in place. We intend to work with the ASTM Task Group to further this development work.

A second source of potential measurement error is that associated with the calibration error allowances, the zero and upscale drift specifications, the mandatory drift adjustment levels, and the imprecision associated with the allowed compensation for dirt accumulation. The imprecision associated with these tolerances may be adequate for assuring the quality of higher opacity measurements but may be inadequate for assuring the quality of measurements of opacity less than 10 percent. In cooperation with the ASTM Task Group, we will continue to evaluate the capabilities of COMS relative to these performance specifications. The purpose of these evaluations is to determine whether tighter specifications are achievable and whether such tighter specifications would assure data of sufficient quality at opacity levels less than 10 percent. Possible outcomes include another revision to PS-1 addressing the on-site performance requirements or a second performance specification directed at COMS used at facilities with opacity limits less than 10 percent.

A third factor is the minimum full-scale range of 80 percent opacity required of COMS in PS-1. This range is necessary in many cases to ensure that short term (i.e., less than 6 minutes) excursions at high opacity levels are captured in the 6-minute average. On the other hand, the specified full-scale range may be inappropriately high for accurate measurements of opacity less than 10 percent for some instruments. We, again in cooperation with the ASTM Task Group, will evaluate a number of options to address this concern. Among potential options is the reduction of the required measurement range for low opacity applications; another is a requirement for dual range output with separate calibration and drift allowances. The revised PS-1 includes an option to establish a site-specific full-scale range of no less than 50 percent opacity at facilities with opacity limits less than 10 percent.

We can estimate the upper range of potential measurement error that may be associated with COMS data by using a propagation of errors statistical analysis of the calibration error, zero and upscale drift, and alignment tolerances as specified in PS-1. This very conservative approach produces a potential measurement error of about 4 percent opacity. A properly operating and aligned COMS should experience measurement error significantly less than this magnitude.

While we recognize the potential for measurement error associated with monitoring opacity where the opacity limit is less than 10 percent, we believe it is inappropriate to limit the applicability of PS-1 based on the applicable emission limit. The final PS-1 is applicable to all COMS required to be certified or recertified. Instead of limiting the applicability, the final PS-1 will take into account (through statistical procedures or otherwise) the measurement uncertainty associated with COMS measurements below 10 percent opacity. Regardless of the potential for error in low level COMS readings, you, the owner or operator, are expected to respond to and correct as soon as possible any indication of excess emissions for an opacity limit consistent with good air pollution control practices for minimizing emissions as required by Part 60 and other regulations.

D. Definitions

All of the definitions from ASTM D 6216-98 are incorporated by reference. Comments received concerning the definitions suggested that they were subject to a variety of interpretations as written. As a result of incorporating ASTM D 6216-98 in its entirety in the final rule, we deleted redundant definitions present in the proposal and we defined terminology exclusive to PS-1 to be consistent with ASTM D 6216-98.

E. Changes in Design Specifications

There were specific changes in the design specifications detailed in the 1994 proposal (59 FR 60585). These changes were a result of the opacity monitor manufacturer evaluations conducted in 1989 and 1990. Also, the specifications for voltage, temperature, and light fluctuations were introduced in the supplemental proposal (63 FR 50824). There were no comments on the specifications, only on the verification procedures for the specifications. The design specifications changes are as follows:

(1) Angle of View and Angle of Projection. The AOV and AOP are reduced from 5 degrees to 4 degrees.

(2) Calibration Drift Checking System. The COMS must provide a means to simulate a zero and an upscale calibration drift check value in order to check the COMS transmitter/receiver calibration drift. The calibration drift checking system must include, at the same time, all active analyzer internal optics with power or curvature, all active electronic circuitry including the light source, photodetector assembly, electronic or electro-

mechanical systems, and hardware and/or software used during normal measurement operation. The upscale calibration check response may not be altered by electronic hardware or software modification during the calibration cycle; the response is representative of the gains and offsets applied to normal effluent opacity measurements.

(3) Alarms and Warnings. The COMS must provide operators visual or audible alarms or fault condition warnings to facilitate proper operation and maintenance of the COMS.

(4) Zero Compensations. The COMS must provide an automated means to assess and record accumulated automatic zero compensations on a 24-hour basis in order to achieve the correct response to the simulated zero device.

(5) Compensation for Dirt Accumulation. The automatic compensation for dirt accumulation on the exposed optical surfaces of the COMS must now include the compensation allowance in the 4 percent opacity tolerance for zero drift adjustment. Only those optical surfaces directly in the light beam path under normal operation to measure opacity may be measured and compensated for dust accumulation. The COMS must now provide a means to display the level of dust compensation.

(6) Opacity Monitor and External Audit Filters. The opacity monitor must now accommodate independent audits of the measurement system response to external audit filters. The external audit filter access design must ensure (a) the filters are used in conjunction with a zero condition based on the same energy level, or within 5 percent of the energy reaching the detector under actual clear path conditions, (b) the entire beam received by the detector will pass through the attenuator, and (c) the attenuator is inserted in a manner that minimizes interference from reflected light.

(7) Opacity Emissions and the Pathlength Correction Factor. The COMS must now automatically correct opacity emissions that are measured at the COMS installation location to the emission outlet pathlength. The COMS must be designed to ensure the pathlength correction factor (PLCF) cannot be changed by the end user, or the PLCF is recorded during each calibration drift check cycle, or an alarm sounds when the PLCF value is changed.

(8) Voltage, Temperature, and Light Fluctuations. As a result of incorporating ASTM D 6216-98 in its entirety, we incorporated three new design specifications to ensure that the accuracy of opacity monitor data is not affected by fluctuations in supply voltage, ambient temperature, and ambient light over the range specified by the manufacturer.

F. Other Revisions

This final rule also contains some revisions to 40 CFR part 60 section 60.13(d)(1) and (d)(2) and several revisions or corrections to PS-1. These revisions and corrections were given in detail in the 1994 proposal (59 FR 60585) and the supplemental proposal (63 FR 50824). There were no comments on the revisions and corrections, which are summarized below.

We revised 60.13(d)(1) to distinguish between gaseous continuous emissions monitoring systems (CEMS) and continuous opacity monitoring systems (COMS).

We revised 60.13(d)(2) to clarify and update which parts of the COMS must be checked by the daily simulated zero and upscale calibration drift checks and to be consistent with ASTM D 6216-98.

Because the new design specifications now require that the opacity monitor exhibit no interference from ambient light, we modified the installation guidelines. The modification removes the limitation of locating the opacity monitor at a place free of interference from ambient light.

III. ADMINISTRATIVE REQUIREMENTS

A. Docket

The docket is an organized and complete file of all information submitted or otherwise considered by EPA in the development of this rulemaking. The principal purposes of the docket are: (1) to allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review (except for interagency review materials) [Clean Air Act Section 307(d)(7)(A)].

B. Executive Order 12866

Under Executive Order 12866 (58 FR 51735 October 4, 1993), EPA must determine whether the regulatory action is Asignificant@ and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines Asignificant regulatory action@ as one that is likely to result in a rule that may: (1) have an annual effect on the economy of $100 million or more or adversely affect in a

material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligation of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President=s priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a Asignificant regulatory action@ under the terms of Executive Order 12866 and is, therefore, not subject to OMB review.

C. Executive Order 13132

Executive Order 13132, entitled AFederalism@ (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure Ameaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.@ APolicies that have federalism implications@ is defined in the Executive Order to include regulations that have Asubstantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.@ Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. The EPA also may not issue a regulation that has federalism implications and that preempts State law unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This final rule is a revision to an existing rule already being used by State and local governments. The revisions have no impact on how State and local governments apply the rule. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

D. Paperwork Reduction Act

This final rule does not contain any information collection requirements subject to the Office of Management and Budget review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 et seq.

E. Regulatory Flexibility

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. EPA has also determined that this rule will not have a significant economic impact on a substantial number of small entities.

This final rule does not have a significant impact on a substantial number of small entities because no additional cost will be incurred by such entities because of the changes specified by the rule. The requirements of the final rule reaffirm the existing design specifications for a COMS to demonstrate conformance with PS-1. The final rule clarifies the verification procedures for the design specifications, as well as clarifies the responsibilities of manufacturers of opacity monitors and the owners/operators without placing additional burden on either parties.

F. Unfunded Mandates Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with Federal mandates that may result in expenditures to State, local, and tribal governments in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205

allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not include a Federal mandate that may result in expenditures of $100 million or more for State, local, or tribal governments in the aggregate, or the private sector in any one year. This rule does not include additional requirements for the performance specifications of opacity monitors; the rule only clarifies the language in the specification. Thus, today' s rule is not subject to the requirements of sections 202 and 205 of the UMRA. EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. Again, the rule does not add any new requirements; it only clarifies the existing requirements.

G. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104-113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rulemaking involves technical standards. EPA decided to use a voluntary consensus standard developed and adopted by the American Society for Testing and Materials (ASTM), ASTM D 6216-98, Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications. This standard was chosen because it was developed by ASTM with EPA involvement. The standard used the

requirements outlined in PS-1 and developed clear and concise verification procedures for the requirements. Copies of the ASTM standard can be obtained by contacting the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428.

H. Executive Order 13045

Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885, April 23, 1997) applies to any rule that (1) is determined to be "economically significant" as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

EPA interprets Executive Order 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5-501 of the Order has the potential to influence the regulation. This rule is not subject to Executive Order 13045 because it does not establish an environmental standard intended to mitigate health or safety risks.

I. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the Federal Register. A major rule cannot take effect until 60 days after it is published in the Federal Register. This action is not a major rule as defined by 5 U.S.C. 804 (2). This rule will be effective [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

J. Executive Order 13084: Consultation and Coordination with Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities,

unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA=s prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation.In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development ofregulatory policies on matters that significantly or uniquely affect their communities. Today's rule does not significantly or uniquely affect the communities of Indian tribal governments. This rule revises an existing regulation which details the performance and design specifications for continuous opacity monitoring systems.

Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

List of Subjects in 40 CFR Part 60

Environmental protection, Air pollution control; Continuous emission monitoring; Incorporation by reference; Opacity; Particulate matter; Performance specification; Preparation, submittal, and adoption of State implementation plans; Transmissometers; Visible emissions.

Dated: July 31, 2000.

Carol M. Browner,
Administrator.

For the reasons stated in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as follows:

Part 60 - Standards of Performance for New Stationary Sources

1. The authority citation for part 60 continues to read as follows:

Authority: 42 U.S.C. 7401, 7411, 7413, 7414, 7416, 7601, and 7602.

Subpart A - General Provisions

2. Amend ' 60.13 by revising paragraphs (d)(1) and (d)(2) as follows:

' 60.13 Monitoring requirements.

* * * * *

(d)(1) Owners and operators of a CEMS installed in accordance with the provisions of this part, must automatically check the zero (or low-level value between 0 and 20 percent of span value) and span (50 to 100 percent of span value) calibration drifts at least once daily in accordance with a written procedure. The zero and span must, as a minimum, be adjusted whenever either the 24-hour zero drift or the 24-hour span drift exceeds two times the limit of the applicable performance specification in appendix B. The system must allow the amount of the excess zero and span drift to be recorded and quantified whenever specified. Owners and operators of a COMS installed in accordance with the provisions of this part, must automatically, intrinsic to the opacity monitor, check the zero and upscale (span) calibration drifts at least once daily. For a particular COMS, the acceptable range of zero and upscale calibration materials is as defined in the applicable version of PS-1 in appendix B of this part. For a COMS, the optical surfaces, exposed to the effluent gases, must be cleaned before performing the zero and upscale drift adjustments, except for systems using automatic zero adjustments. The optical surfaces must be cleaned when the cumulative automatic zero compensation exceeds 4 percent opacity.

(2) Unless otherwise approved by the Administrator, the following procedures must be followed for a COMS. Minimum procedures must include an automated method for producing a simulated zero opacity condition and an upscale opacity condition using a certified neutral density filter or other related technique to produce a known obstruction of the light beam. Such procedures must provide a system check of all active analyzer internal optics with power or curvature, all active electronic circuitry including the light source and photodetector assembly,

and electronic or electro-mechanical systems and hardware and or software used during normal measurement operation.

* * * * *

3. Amend ' 60.17 by adding paragraph (a)(64) as follows:

' 60.17 Incorporation by reference.

* * * * *

(a) * * *

(64) ASTM D 6216-98 Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications, IBR approved [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER] for appendix B, PS-1.

* * * * *

4. Appendix B, Performance Specification 1 is revised to read as follows:

APPENDIX B - PERFORMANCE SPECIFICATIONS

* * * * *

PERFORMANCE SPECIFICATION 1 - Specifications and Test Procedures for Continuous Opacity Monitoring Systems in Stationary Sources

1.0 What is the purpose and applicability of Performance Specification 1?

Performance Specification 1 (PS-1) provides (1) requirements for the design, performance, and installation of a continuous opacity monitoring system (COMS) and (2) data computation procedures for evaluating the acceptability of a COMS. It specifies activities for two groups (1) the owner or operator and (2) the opacity monitor manufacturer.

1.1 Measurement Parameter. PS-1 covers the instrumental measurement of opacity caused by attenuation of projected light due to absorption and scatter of the light by particulate matter in the effluent gas stream.

1.2 What COMS must comply with PS-1? If you are an owner or operator of a facility with a COMS as a result of this Part, then PS-1 applies to your COMS if one of the following is true:

(1) your facility has a new COMS installed after (INSERT 180 DAYS AFTER THE DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER); or

(2) your COMS is replaced, relocated, or substantially refurbished (in the opinion of the regulatory authority) after [INSERT 180 DAYS AFTER THE DATE OF PUBLICATION IN THE FEDERAL REGISTER]; or

(3) your COMS was installed before [INSERT 180 DAYS AFTER THE DATE OF PUBLICATION IN THE FEDERAL REGISTER] and is specifically required by regulatory action other than the promulgation of PS-1 to be recertified.

If you are an opacity monitor manufacturer, then paragraph 8.2 applies to you.

1.3 Does PS-1 apply to a facility with an applicable opacity limit less than 10 percent? If you are an owner or operator of a facility with a COMS as a result of this Part and the applicable opacity limit is less than 10 percent, then PS-1 applies to your COMS as described in section 1.2; taking into account (through statistical procedures or otherwise) the uncertainties associated with opacity measurements, and following the conditions for attenuators

selection for low opacity applications as outlined in Section 8.1(3)(ii). At your option, you, the source owner or operator, may select to establish a reduced full-scale range of no less than 50 percent opacity instead of the 80 percent as prescribed in section 3.5, if the applicable opacity limit for your facility is less than 10 percent. The EPA recognizes that reducing the range of the analyzer to 50 percent does not necessarily result in any measurable improvement in measurement accuracy at opacity levels less than 10 percent; however, it may allow improved chart recorder interpretation.

1.4 What data uncertainty issues apply to COMS data? The measurement uncertainties associated with COMS data result from several design and performance factors including limitations on the availability of calibration attenuators for opacities less than about 6 percent (3 percent for single-pass instruments), calibration error tolerances, zero and upscale drift tolerances, and allowance for dust compensation that are significant relative to low opacity levels. The full-scale requirements of this PS may also contribute to measurement uncertainty for opacity measurements where the applicable limits are below 10 percent opacity.

2.0 What are the basic requirements of PS-1?

PS-1 requires (1) opacity monitor manufacturers comply with a comprehensive series of design and performance specifications and test procedures to certify opacity monitoring equipment before shipment to the end user, (2) the owner or operator to follow installation guidelines, and (3) the owner or operator to conduct a set of field performance tests that confirm the acceptability of the COMS after it is installed.

2.1 ASTM D 6216-98 is the reference for design specifications, manufacturer-s performance specifications, and test procedures. The opacity monitor manufacturer must periodically select and test an opacity monitor, that is representative of a group of monitors produced during a specified period or lot, for conformance with the design specifications in ASTM D 6216-98. The opacity monitor manufacturer must test each opacity monitor for conformance with the manufacturer-s performance specifications in ASTM D 6216-98.

2.2 Section 8.1(2) provides guidance for locating an opacity monitor in vertical and horizontal ducts. You are encouraged to seek approval for the opacity monitor location from the appropriate regulatory authority prior to installation.

2.3 After the COMS is installed and calibrated, the owner or operator must test the COMS for conformance with the field performance specifications in PS-1.

3.0 What special definitions apply to PS-1?

3.1 All definitions and discussions from section 3 of ASTM D 6216-98 are applicable to PS-1.

3.2 Centroid Area. A concentric area that is geometrically similar to the stack or duct cross-section and is no greater than 1 percent of the stack or duct cross-sectional area.

3.3 Data Recorder. That portion of the installed COMS that provides a permanent record of the opacity monitor output in terms of opacity. The data recorder may include automatic data reduction capabilities.

3.4 External Audit Device. The inherent design, equipment, or accommodation of the opacity monitor allowing the independent assessment of the COMS's calibration and operation.

3.5 Full Scale. The maximum data display output of the COMS. For purposes of recordkeeping and reporting, full scale will be greater than 80 percent opacity.

3.6 Operational Test Period. A period of time (168 hours) during which the COMS is expected to operate within the established performance specifications without any unscheduled maintenance, repair, or adjustment.

3.7 Primary Attenuators. Those devices (glass or grid filter that reduce the transmission of light) calibrated according to procedures in section 7.1.

3.8 Secondary Attenuators. Those devices (glass or grid filter that reduce the transmission of light) calibrated against primary attenuators according to procedures in section 7.2.

3.9 System Response Time. The amount of time the COMS takes to display 95 percent of a step change in opacity on the COMS data recorder.

4.0 Interferences. Water droplets

5.0 What do I need to know to ensure the safety of persons using PS-1?

The procedures required under PS-1 may involve hazardous materials, operations, and equipment. PS-1 does not purport to address all of the safety problems associated with these procedures. Before performing these procedures, you must establish appropriate safety and health practices, and you must determine the applicable regulatory limitations. You should consult the COMS user's manual for specific precautions to take.

6.0 What equipment and supplies do I need?

6.1 Continuous Opacity Monitoring System. You, as owner or operator, are responsible for purchasing an opacity monitor that meets the specifications of ASTM D 6216-98, including a suitable data recorder or automated data acquisition handling system. Example data recorders include an analog strip chart recorder or more

appropriately an electronic data acquisition and reporting system with an input signal range compatible with the analyzer output.

6.2 Calibration Attenuators. You, as owner or operator, are responsible for purchasing a minimum of three calibration attenuators that meet the requirements of PS-1. Calibration attenuators are optical filters with neutral spectral characteristics. Calibration attenuators must meet the requirements in section 7 and must be of sufficient size to attenuate the entire light beam received by the detector of the COMS. For transmissometers operating over a narrow bandwidth (e.g., laser), a calibration attenuator's value is determined for the actual operating wavelengths of the transmissometer. Some filters may not be uniform across the face. If errors result in the daily calibration drift or calibration error test, you may want to examine the across-face uniformity of the filter.

6.3 Calibration Spectrophotometer. Whoever calibrates the attenuators must have a spectrophotometer that meets the following minimum design specifications:

PARAMETER	SPECIFICATION
Wavelength range	300-800 nm
Detector angle of view	<10E
Accuracy	<0.5% transmittance, NIST traceable calibration

7.0 What reagents and standards do I need?

You will need to use attenuators (i.e., neutral density filters) to check the daily calibration drift and calibration error of a COMS. Attenuators are designated as either primary or secondary based on how they are calibrated.

7.1 Attenuators are designated primary in one of two ways:

(1) They are calibrated by NIST; or

(2) They are calibrated on a 6-month frequency through the assignment of a luminous transmittance value in the following manner:

(i) Use a spectrophotometer meeting the specifications of section 6.3 to calibrate the required filters. Verify the spectrophotometer calibration through use of a NIST 930D Standard Reference Material (SRM). A SRM 930D consists of three neutral density glass filters and a blank, each mounted in a cuvette. The wavelengths and

temperature to be used in the calibration are listed on the NIST certificate that accompanies the reported values. Determine and record a transmittance of the SRM values at the NIST wavelengths (three filters at five wavelengths each for a total of 15 determinations). Calculate a percent difference between the NIST certified values and the spectrophotometer response. At least 12 of the 15 differences (in percent) must be within "0.5 percent of the NIST SRM values. No difference can be greater than "1.0 percent. Recalibrate the SRM or service the spectrophotometer if the calibration results fail the criteria.

(ii) Scan the filter to be tested and the NIST blank from wavelength 380 to 780 nm, and record the spectrophotometer percent transmittance responses at 10 nm intervals. Test in this sequence: blank filter, tested filter, tested filter rotated 90 degrees in the plane of the filter, blank filter. Calculate the average transmittance at each 10 nm interval. If any pair of the tested filter transmittance values (for the same filter and wavelength) differ by more than "0.25 percent, rescan the tested filter. If the filter fails to achieve this tolerance, do not use the filter in the calibration tests of the COMS.

(iii) Correct the tested filter transmittance values by dividing the average tested filter transmittance by the average blank filter transmittance at each 10 nm interval.

(iv) Calculate the weighted (to the response of the human eye), tested filter transmittance by multiplying the transmittance value by the corresponding response factor shown in table 1-1, to obtain the Source C Human Eye Response.

(v) Recalibrate the primary attenuators semi-annually if they are used for the required calibration error test. Recalibrate the primary attenuators annually if they are used only for calibration of secondary attenuators.

7.2 Attenuators are designated secondary if the filter calibration is done using a laboratory-based transmissometer. Conduct the secondary attenuator calibration using a laboratory-based transmissometer calibrated as follows:

(i) Use at least three primary filters of nominal luminous transmittance 50, 70 and 90 percent, calibrated as specified in section 7.1(2)(i), to calibrate the laboratory-based transmissometer. Determine and record the slope of the calibration line using linear regression through zero opacity. The slope of the calibration line must be between 0.99 and 1.01, and the laboratory-based transmissometer reading for each primary filter must not deviate by more than "2 percent from the linear regression line. If the calibration of the laboratory-based transmissometer yields a slope or individual readings outside the specified ranges, secondary filter calibrations cannot be performed.

Determine the source of the variations (either transmissometer performance or changes in the primary filters) and repeat the transmissometer calibration before proceeding with the attenuator calibration.

(ii) Immediately following the laboratory-based transmissometer calibration, insert the secondary attenuators and determine and record the percent effective opacity value per secondary attenuator from the calibration curve (linear regression line).

(iii) Recalibrate the secondary attenuators semi-annually if they are used for the required calibration error test.

8.0 What performance procedures are required to comply with PS-1?

Procedures to verify the performance of the COMS are divided into those completed by the owner or operator and those completed by the opacity monitor manufacturer.

8.1 What procedures must I follow as the Owner or Operator?

(1) You must purchase an opacity monitor that complies with ASTM D 6216-98 and obtain a certificate of conformance from the opacity monitor manufacturer.

(2) You must install the opacity monitor at a location where the opacity measurements are representative of the total emissions from the affected facility. You must meet this requirement by choosing a measurement location and a light beam path as follows:

(i) Measurement Location. Select a measurement location that is (1) at least 4 duct diameters downstream from all particulate control equipment or flow disturbance, (2) at least 2 duct diameters upstream of a flow disturbance, (3) where condensed water vapor is not present, and (4) accessible in order to permit maintenance.

(ii) Light Beam Path. Select a light beam path that passes through the centroidal area of the stack or duct. Also, you must follow these additional requirements or modifications for these measurement locations:

If your measurement location is in a:	And is:	Then use a light beam path that is:
straight vertical section of stack or duct	less than 4 equivalent diameters downstream from a bend	in the plane defined by the upstream bend (see figure 1-1)
straight vertical section of stack or duct	less than 4 equivalent diameters upstream from a bend	in the plane defined by the downstream bend (see figure 1-2)
straight vertical section of stack or duct	less than 4 equivalent diameters downstream and is also less than	in the plane defined by the upstream bend (see figure 1-3)

If your measurement location is in a:	And is:	Then use a light beam path that is:
	1 diameter upstream from a bend	
horizontal section of stack or duct	at least 4 equivalent diameters downstream from a vertical bend	in the horizontal plane that is between a and 2 the distance up the vertical axis from the bottom of the duct (see figure 1-4)
horizontal section of duct	less than 4 equivalent diameters downstream from a vertical bend	in the horizontal plane that is between 2 and b the distance up the vertical axis from the bottom of the duct for upward flow in the vertical section, and is between a and 2 the distance up the vertical axis from the bottom of the duct for downward flow (figure 1-5)

(iii) Alternative Locations and Light Beam Paths. You may select locations and light beam paths, other than those cited above, if you demonstrate, to the satisfaction of the Administrator or delegated agent, that the average opacity measured at the alternative location or path is equivalent to the opacity as measured at a location meeting the criteria of sections 8.1(2)(i) and 8.1(2)(ii). The opacity at the alternative location is considered equivalent if (1) the average opacity value measured at the alternative location is within " 10 percent of the average opacity value measured at the location meeting the installation criteria, and (2) the difference between any two average opacity values is less than 2 percent opacity (absolute). You use the following procedure to conduct this demonstration: simultaneously measure the opacities at the two locations or paths for a minimum period of time (e.g., 180-minutes) covering the range of normal operating conditions and compare the results. The opacities of the two locations or paths may be measured at different times, but must represent the same process operating conditions. You may use alternative procedures for determining acceptable locations if those procedures are approved by the Administrator.

(3) Field Audit Performance Tests. After you install the COMS, you must perform the following procedures and tests on the COMS.

(i) Optical Alignment Assessment. Verify and record that all alignment indicator devices show proper alignment. A clear indication of alignment is one that is objectively apparent relative to reference marks or conditions.

(ii) Calibration Error Check. Conduct a three-point calibration error test using three calibration attenuators that produce outlet pathlength corrected, single-pass opacity values shown in ASTM D 6216-98, section 7.5. If your applicable limit is less than 10 percent opacity, use attenuators as described in ASTM D 6216-98, section 7.5 for applicable standards of 10 to 19 percent opacity. Confirm the external audit device produces the proper zero value on the COMS data recorder. Separately, insert each calibration attenuators (low, mid, and high-level) into the external audit device. While inserting each attenuator, (1) ensure that the entire light beam passes through the attenuator, (2) minimize interference from reflected light, and (3) leave the attenuator in place for at least two times the shortest recording interval on the COMS data recorder. Make a total of five nonconsecutive readings for each attenuator. At the end of the test, correlate each attenuator insertion to the corresponding value from the data recorder. Subtract the single-pass calibration attenuator values corrected to the stack exit conditions from the COMS responses. Calculate the arithmetic mean difference, standard deviation, and confidence coefficient of the five measurements value using equations 1-3, 1-4, and 1-5. Calculate the calibration error as the sum of the absolute value of the mean difference and the 95 percent confidence coefficient for each of the three test attenuators using equation 1-6. Report the calibration error test results for each of the three attenuators.

(iii) System Response Time Check. Using a high-level calibration attenuator, alternately insert the filter five times and remove it from the external audit device. For each filter insertion and removal, measure the amount of time required for the COMS to display 95 percent of the step change in opacity on the COMS data recorder. For the upscale response time, measure the time from insertion to display of 95 percent of the final, steady upscale reading. For the downscale response time, measure the time from removal to display 5 percent of the initial upscale reading. Calculate the mean of the five upscale response time measurements and the mean of the five downscale response time measurements. Report both the upscale and downscale response times.

(iv) Averaging Period Calculation and Recording Check. After the calibration error check, conduct a check of the averaging period calculation (e.g., 6-minute integrated average). Consecutively insert each of the calibration error check attenuators (low, mid, and high-level) into the external audit device for a period of two times the averaging period plus 1 minute (e.g., 13 minutes for a 6-minute averaging period). Compare the path length

corrected opacity value of each attenuator to the valid average value calculated by the COMS data recording device for that attenuator.

(4) Operational Test Period. Before conducting the operational testing, you must have successfully completed the field audit tests described in sections 8.1(3)(i) through 8.1(3)(iv). Then, you operate the COMS for an initial 168-hour test period while the source is operating under normal operating conditions. If normal operations contain routine source shutdowns, include the source=s down periods in the 168-hour operational test period. However, you must ensure that the following minimum source operating time is included in the operational test period: (1) for a batch operation, the operational test period must include at least one full cycle of batch operation during the 168-hour period unless the batch operation is longer than 168 hours or (2) for continuous operating processes, the unit must be operating for at least 50 percent of the 168-hour period. Except during times of instrument zero and upscale calibration drift checks, you must analyze the effluent gas for opacity and produce a permanent record of the COMS output. During this period, you may not perform unscheduled maintenance, repair, or adjustment to the COMS. Automatic zero and calibration adjustments (i.e., intrinsic adjustments), made by the COMS without operator intervention or initiation, are allowable at any time. At the end of the operational test period, verify and record that the COMS optical alignment is still correct. If the test period is interrupted because of COMS failure, record the time when the failure occurred. After the failure is corrected, you restart the 168-hour period and tests from the beginning (0-hour). During the operational test period, perform the following test procedures:

(i) Zero Calibration Drift Test. At the outset of the 168-hour operational test period and at each 24-hour interval, the automatic calibration check system must initiate the simulated zero device to allow the zero drift to be determined. Record the COMS response to the simulated zero device. After each 24-hour period, subtract the COMS zero reading from the nominal value of the simulated zero device to calculate the 24-hour zero drift (ZD). At the end of the 168-hour period, calculate the arithmetic mean, standard deviation, and confidence coefficient of the 24-hour ZDs using equations 1-3, 1-4, and 1-5. Calculate the sum of the absolute value of the mean and the absolute value of the confidence coefficient using equation 1-6, and report this value as the 24-hour ZD error.

(ii) Upscale Calibration Drift Test. At each 24-hour interval after the simulated zero device value has been checked, check and record the COMS response to the upscale calibration device. After each 24-hour period, subtract the COMS upscale reading from the nominal value of the upscale calibration device to calculate the 24-hour

calibration drift (CD). At the end of the 168-hour period, calculate the arithmetic mean, standard deviation, and confidence coefficient of the 24-hour CD using equations 1-3, 1-4, and 1-5. Calculate the sum of the absolute value of the mean and the absolute value of the confidence coefficient using equation 1-6, and report this value as the 24-hour CD error.

(5) Retesting. If the COMS fails to meet the specifications for the tests conducted under the operational test period, make the necessary corrections and restart the operational test period. Depending on the opinion of the enforcing agency, you may have to repeat some or all of the field audit tests.

8.2 What are the responsibilities of the Opacity Monitor Manufacturer?

You, the manufacturer, must carry out the following activities:

(1) Conduct the verification procedures for design specifications in section 6 of ASTM D 6216-98.

(2) Conduct the verification procedures for performance specifications in section 7 of ASTM D 6216-98.

(3) Provide to the owner or operator, a report of the opacity monitor's conformance to the design and performance specifications required in sections 6 and 7 of ASTM D 6216-98 in accordance with the reporting requirements of section 9 in ASTM D 6216-98.

9.0 What quality control measures are required by PS-1?

Opacity monitor manufacturers must initiate a quality program following the requirements of ASTM D 6216-98, section 8. The quality program must include (1) a quality system and (2) a corrective action program.

10.0 Calibration and Standardization. [Reserved]

11.0 Analytical Procedure. [Reserved]

12.0 What calculations are needed for PS-1?

12.1 Desired Attenuator Values. Calculate the desired attenuator value corrected to the emission outlet pathlength as follows:

$$OP_2 = 1 - (1 - OP_1)^{\frac{L_2}{L_1}}$$

Where:

OP_1 = Nominal opacity value of required low-, mid-, or high-range calibration attenuators.

OP_2 = Desired attenuator opacity value from ASTM D 6216-98, section 7.5 at the opacity limit required by the applicable subpart.

L_1 = Monitoring pathlength.

L_2 = Emission outlet pathlength.

12.2 Luminous Transmittance Value of a Filter. Calculate the luminous transmittance of a filter as

$$LT = \frac{\sum_{i=300_{nm}}^{i=800_{nm}} T_i}{100,000}$$

follows:

Where:

LT = Luminous transmittance

T_i = Weighted tested filter transmittance.

12.3 Arithmetic Mean. Calculate the arithmetic mean of a data set as follows:

$$\underline{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

Where:

$\underline{x}$ = Arithmetic mean

n = Number of data points

$\sum_{i=1}^{n} x_i$ = Algebraic sum of the individual measurements,

x_i.

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}}{n-1}}$$

12.4 Standard Deviation. Calculate the standard deviation as follows:

Where:

S_d = Standard deviation of a data set.

12.5 Confidence Coefficient. Calculate the 2.5 percent error confidence coefficient (one-tailed) as follows:

$$CC = \frac{t_{0.975} S_d}{\sqrt{n}}$$

Where:

CC = Confidence coefficient

$t_{0.975}$ = t-value (see table 1-2).

12.6 Calibration Error. Calculate the error (calibration error, zero drift error, and calibration drift error) as

$$Er = |\bar{x}| + |CC|$$

follows:

Where:

Er = Error.

12.7 Conversion of Opacity Values for Monitor Pathlength to Emission Outlet Pathlength. When the monitor pathlength is different from the emission outlet pathlength, use either of the following equations to convert

$$\log (1 - Op_2) = \frac{L_2}{L_1} \log (1 - Op_1)$$

from one basis to the other (this conversion may be automatically calculated by the monitoring system):

$$OD_2 = \frac{L_2}{L_1} x\, OD_1$$

Where:

Op_1 = Opacity of the effluent based upon L_1.

Op_2 = Opacity of the effluent based upon L_2.

L_1 = Monitor pathlength.

L_2 = Emission outlet pathlength.

OD_1 = Optical density of the effluent based upon L_1.

OD_2 = Optical density of the effluent based upon L_2.

12.8 Mean Response Wavelength. Calculate the mean of the effective spectral response curve from the

$$L = \frac{\sum_{i=1}^{n} L_i g_i}{\sum_{i=1}^{n} g_i}$$

individual responses at the specified wavelength values as follows:

Where:

L =mean of the effective spectral response curve

L_i =The specified wavelength at which the response g_i is calculated at 20 nm intervals.

g_i =The individual response value at L_i.

13.0 What specifications does a COMS have to meet for certification?

A COMS must meet the following design, manufacturer-s performance, and field audit performance specifications:

13.1 Design Specifications. The opacity monitoring equipment must comply with the design specifications of ASTM D 6216-98.

13.2 Manufacturer-s Performance Specifications. The opacity monitor must comply with the manufacturer-s performance specifications of ASTM D 6216-98.

13.3 Field Audit Performance Specifications. The installed COMS must comply with the following performance specifications:

(1) Optical Alignment. Objectively indicate proper alignment relative to reference marks (e.g., bull-s-eye) or conditions.

(2) Calibration Error. The calibration error must be #3 percent opacity for each of the three calibration attenuators.

(3) System Response Time. The COMS upscale and downscale response times must be #10 seconds as measured at the COMS data recorder.

(4) Averaging Period Calculation and Recording. The COMS data recorder must average and record each calibration attenuator value to within " 2 percent opacity of the certified value of the attenuator.

(5) Operational Test Period. The COMS must be able to measure and record opacity and to perform daily calibration drift assessments for 168 hours without unscheduled maintenance, repair, or adjustment.

(6) Zero and Upscale Calibration Drift Error. The COMS zero and upscale calibration drift error must not exceed 2 percent opacity over a 24-hour period.

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 Which references are relevant to this method?

1. Experimental Statistics. Department of Commerce. National Bureau of Standards Handbook 91. Paragraph 3-3.1.4. 1963. 3-31 p.

2. Performance Specifications for Stationary Source Monitoring Systems for Gases and Visible Emissions, EPA-650/2-74-013, January 1974, U. S. Environmental Protection Agency, Research Triangle Park, NC.

3. Koontz, E.C., Walton, J. Quality Assurance Programs for Visible Emission Evaluations. Tennessee Division of Air Pollution Control. Nashville, TN. 78th Meeting of the Air Pollution Control Association. Detroit, MI. June 16-21, 1985.

4. Evaluation of Opacity CEMS Reliability and Quality Assurance Procedures. Volume 1. U. S. Environmental Protection Agency. Research Triangle Park, NC. EPA-340/1-86-009a.

5. Nimeroff, I. "Colorimetry Precision Measurement and Calibration." NBS Special Publication 300. Volume 9. June 1972.

6. Technical Assistance Document: Performance Audit Procedures for Opacity Monitors. U. S. Environmental Protection Agency. Research Triangle Park, NC. EPA-600/8-87-025. April 1987.

7. Technical Assistance Document: Performance Audit Procedures for Opacity Monitors. U. S. Environmental Protection Agency. Research Triangle Park, NC. EPA-450/4-92-010. April 1992.

8. ASTM D 6216-98: Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications. American Society for Testing and Materials (ASTM). April 1998.

17.0 What tables and diagrams are relevant to this method?

17.1 Reference Tables.

TABLE 1-1. SOURCE C, HUMAN EYE RESPONSE FACTOR

Wavelength Nanometers	Weighting Factor[a]	Wavelength Nanometers	Weighting Factor[a]
380	0	590	6627
390	0	600	5316
400	2	610	4176
410	9	620	3153
420	37	630	2190
430	122	640	1443
440	262	650	886
450	443	660	504
460	694	670	259
470	1058	680	134
480	1618	690	62
490	2358	700	29
500	3401	720	14
510	4833	720	6
520	6462	730	3
530	7934	740	2
540	9194	750	1
550	9832	760	1
560	9841	770	0
570	9147	780	0
580	7992	-	-

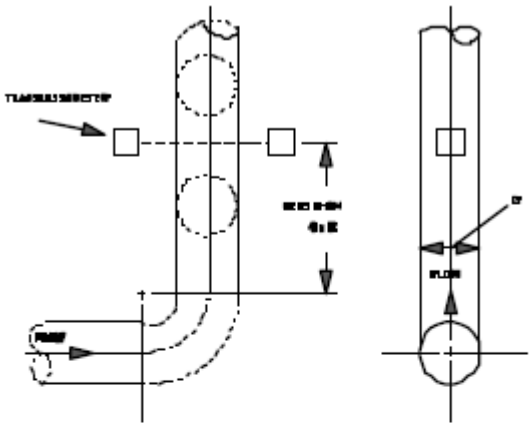
[a]Total of weighting factors = 100,000.

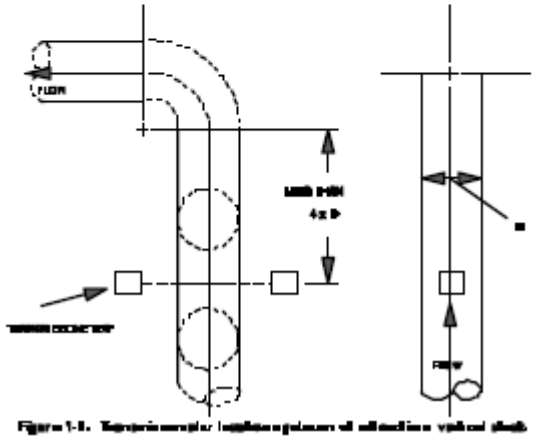
TABLE 1-2. ^{T}-VALUES

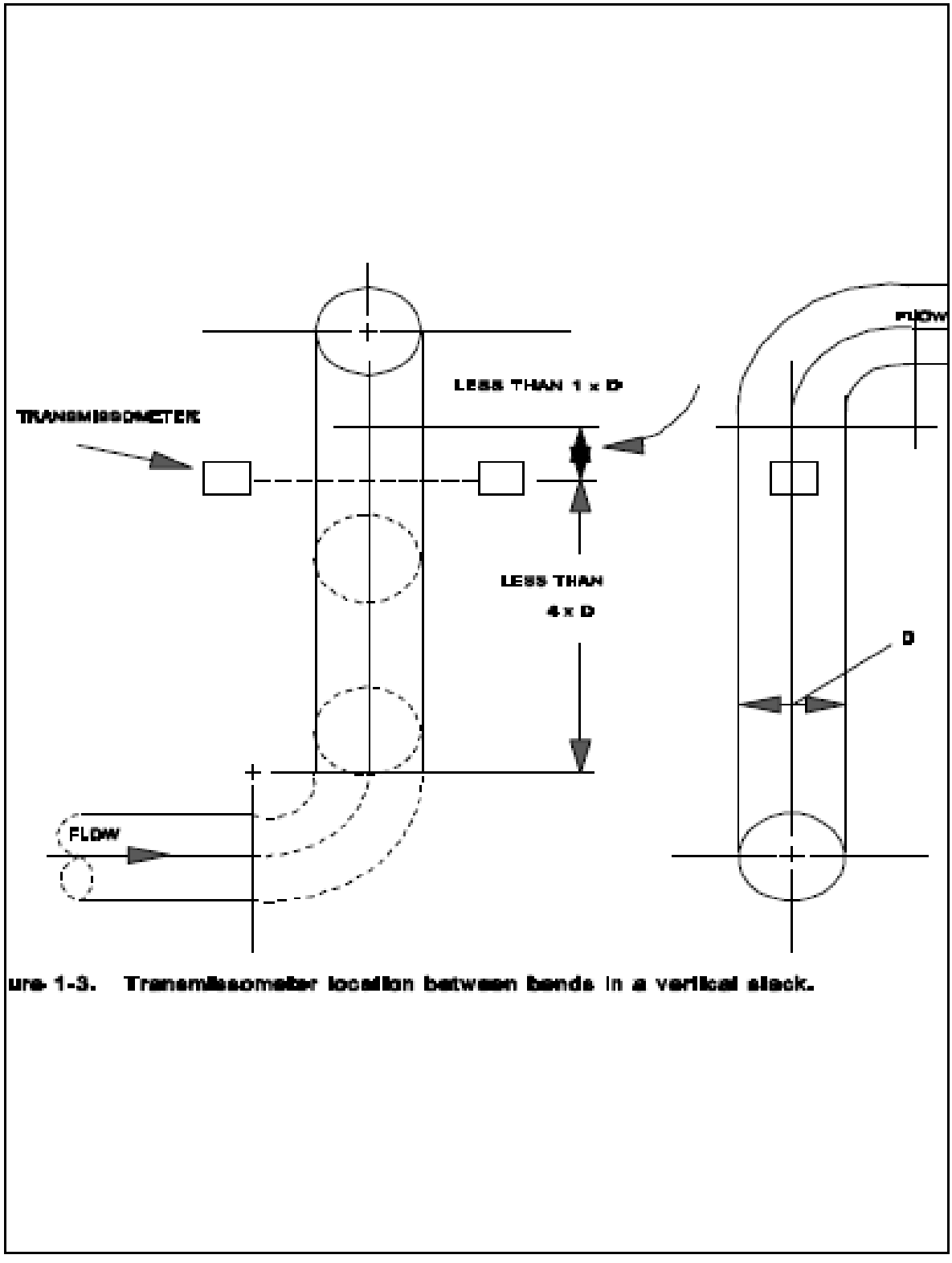
n^a	$^{t}0.975$	n^a	$^{t}0.975$	n^a	$^{t}0.975$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

[a]The values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of individual values.

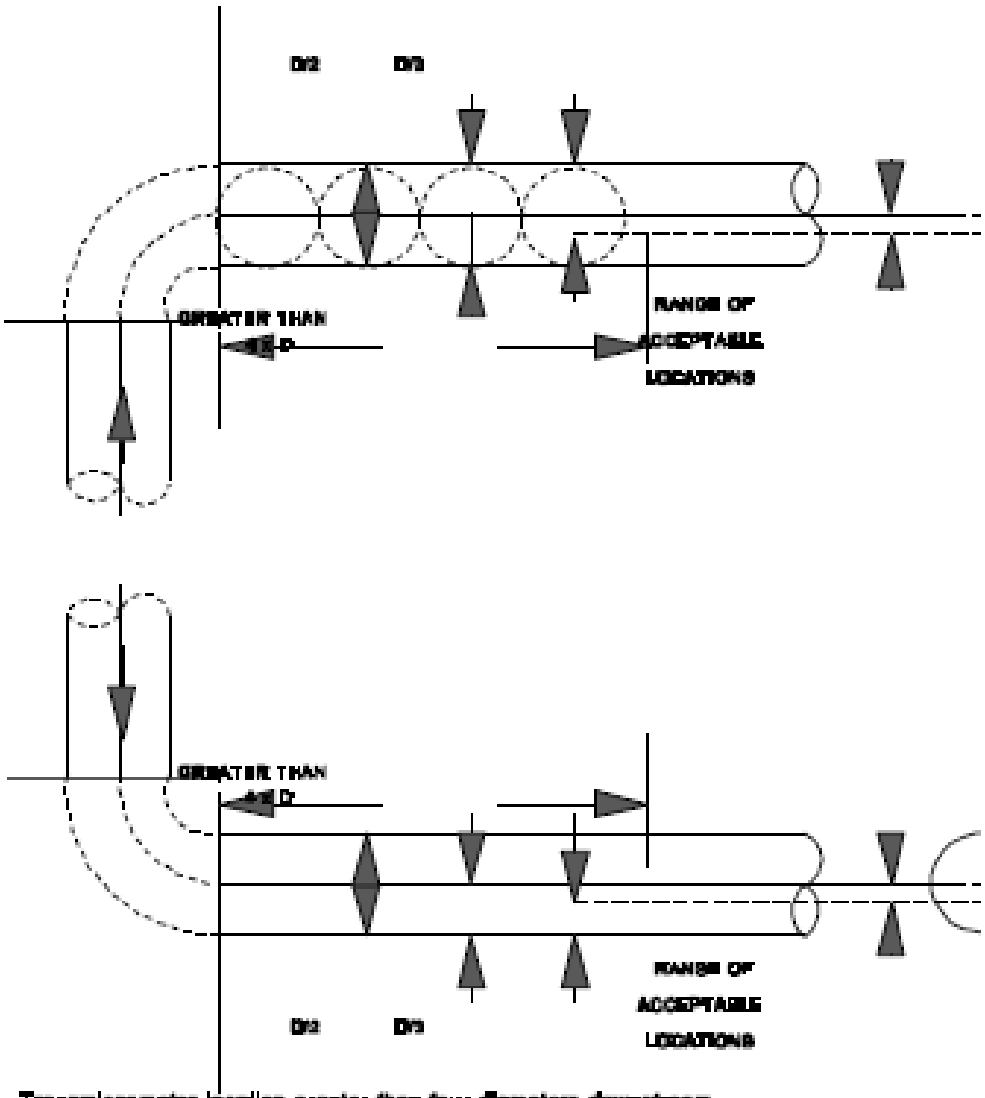
17.2 Diagrams.



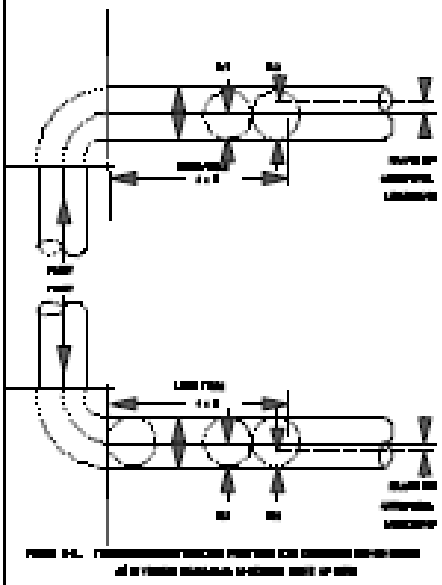




ure 1-3. Transmissometer location between bends in a vertical stack.



4. Transmissometer location greater than four diameters downstream of a vertical bend in a horizontal stack or duct.



Attachment 2

326 IAC

Note: The following are excerpts from 326 IAC 3-5 which have direct bearing on the certification and quality assurance/quality control of continuous opacity monitoring systems. To obtain a complete copy of this or any other Indiana air rules please contact Legislative Services Agency at (317) 232-9557.

326 IAC 3-5-2 Minimum performance and operating specifications
Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11
Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 2. Owners and operators of monitoring equipment installed to comply with this rule shall comply with the performance specifications and operating requirements as follows:

(1) Performance specifications set forth in 40 CFR 60*, Appendix B, shall be used to certify monitoring equipment installed pursuant to this rule; however, where reference is made to the administrator in 40 CFR 60*, Appendix B, the term "department" shall be inserted for purposes of this rule, and where continuous emissions monitors were installed prior to March 1983 for measuring opacity, the performance specifications in 40 CFR 60*, Appendix B, 1982 Edition, shall apply.

(2) Cycling times, which include the total time a monitoring system requires to sample, analyze, and record an emission measurement, shall be as follows:

(A) Continuous monitoring systems for measuring opacity shall complete a minimum of one (1) cycle of operation (sampling, analyzing, and data recording) for each successive ten (10) second period.

(B) Continuous monitoring systems that measure the following emissions shall complete a minimum of one (1) cycle of operation (sampling, analyzing, and data recording) for each successive fifteen (15) minute measuring period:

(i) Carbon dioxide (CO_2).
(ii) Carbon monoxide (CO).
(iii) Hydrogen sulfide (H_2S).
(iv) Oxides of nitrogen (NO_x).
(v) Oxygen (O_2).
(vi) Sulfur dioxide (SO_2).
(vii) Total hydrocarbons (THC).
(viii) Total reduced sulfur (TRS).
(ix) Volatile organic compounds (VOC).

(3) For opacity monitoring when effluent from two (2) or more affected facilities is combined before being released to the atmosphere, the owner or operator may either:

(A) install a continuous opacity monitoring system on the combined effluent; or

(B) install a continuous opacity monitoring system comprised of, and capable of combining the signals from, component transmissometers on each effluent stream.

Results shall be reported on combined effluent. This requirement shall not apply to facilities utilizing wet flue gas desulfurization equipment. For facilities using wet flue gas desulfurization equipment, opacity may be reported on the combined exhaust or on individual exhausts except as provided for facilities affected by an NSPS as

described at 40 CFR 60.13(i)*. Compliance for facilities that opt to report on the individual exhausts shall be determined on the individual exhausts based on data provided in accordance with section 7 of this rule.

(4) When the effluent from two (2) or more affected facilities subject to the same emission standard, other than opacity, are combined before being released to the atmosphere, the owner or operator may report the results as required for each affected facility or for the combined effluent.

(5) Instrument full-scale response or upper limit of concentration measurement range for all opacity monitoring systems shall be set at one hundred percent (100%) opacity if possible. If the monitoring system is a requirement of 40 CFR 60*, 40 CFR 61*, 40 CFR 63*, or 40 CFR 75*, then the appropriate instrument span values and cycling times pursuant to the applicable part shall be used. In all cases, the manufacturer's procedures for calibration shall be followed and may result in an upscale maximum response of less than one hundred percent (100%). The minimum instrument full-scale response for gaseous monitoring systems shall be set at two hundred percent (200%) of the expected instrument data display output corresponding to the emission limitation for the facility unless a request for an alternative setting that provides the following information is submitted to and approved by the department in writing:

(A) The proposed alternate instrument span value.

(B) The expected range of pollutant measured concentrations.

(C) The control device in use.

(D) The process to be controlled.

(E) The location of the monitor, such as stack or duct.

(F) The reason for requesting the alternate instrument span value.

(6) Locations for installing continuous monitoring systems or monitoring devices that vary from locations provided under the performance specifications of 40 CFR 60*, Appendix B, shall be approved by the department and the U.S. EPA upon a demonstration by the owner or operator that installation at alternative locations will enable accurate and representative measurements.

(7) Owners or operators of affected facilities shall conduct continuous emission monitoring system performance evaluations, upon the request of the department, to demonstrate continuing compliance of the continuous emission monitoring systems with performance specifications as follows:

(A) A performance evaluation is a quantitative and qualitative evaluation of the performance of the continuous emission monitor in terms of:

(i) accuracy;

(ii) precision;

(iii) reliability;

(iv) representativeness; and

(v) comparability;

of the data acquired by the monitoring system.

(B) The department may request owners or operators of affected facilities, as defined in section 1(b) of this rule, to conduct continuous emission monitoring system performance evaluations if the department has reason to believe, based on review of monitoring data, quality assurance data, inspections, or other information, that the continuous emission monitoring system is malfunctioning or may be providing invalid data over an extended period.

(C) A written report containing the complete information of the performance evaluations shall be furnished to the department within forty-five (45) days after the test date. The department may conduct performance evaluations of the continuous emission monitoring systems at any time in order to verify the continued compliance of the systems with the performance specifications.

*Copies of the Code of Federal Regulations (CFR) referenced may be obtained from the Government Printing Office, Washington, D.C. 20402 and are available for copying at the Indiana Department of Environmental Management, Office of Air Management, Indiana Government Center-North, 100 North Senate Avenue, Indianapolis, Indiana 46206-6015. *(Air Pollution Control Board; 326 IAC 3-5-2; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2066)*

326 IAC 3-5-3 Monitor system certification

Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11

Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 3. Monitor system certification requirements apply to sources and facilities subject to this rule as follows:

(1) The owner or operator shall conduct the applicable performance specifications tests in accordance with the procedures specified in 40 CFR 60**, or other applicable federal regulations, for the required monitoring system as follows:

(A) Not later than one hundred eighty (180) days after a facility start-up or initial monitor installation date.

(B) Not later than forty-five (45) unit operating days after monitor replacement date, or significant monitor repair as described in IDEM's Quality Assurance Manual, Chapter 20 (dated June 20, 1997)*, which affects the ability of the analyzer to function date.

(2) The owner or operator shall notify the department in writing as follows:

(A) No less than fourteen (14) days in advance of the start of continuous opacity monitor (COM) certification.

(B) No less than thirty-five (35) days in advance of the certification of a gaseous monitoring system.

(3) The owner or operator shall submit all the required test data and information in the form of a written report to the department for review and approval within forty-five (45) days of completion of the performance specification test.

(4) The department shall issue a written notice of certification status upon review of the complete certification test report. A required monitoring system is certified when the department issues a certification letter stating that the required monitoring system, including all applicable components, has satisfactorily met all federal and state monitoring requirements.

(5) The department may decertify a required monitoring system if an audit or performance evaluation reveals that such monitoring system or a component thereof does not meet applicable performance specifications or requirements. The owner or operator shall repeat the certification process for the required monitoring system within forty-five (45) days of the date of the department's decertification of the required monitoring system.

*Copies of IDEM's Quality Assurance Manual, Chapter 20 (dated June 20, 1997) are available for copying at the Indiana Department of Environmental Management, Indiana Government Center-North, 100 North Senate Avenue, Indianapolis, Indiana 46206-6015.

**Copies of the Code of Federal Regulations (CFR) referenced may be obtained from the Government Printing Office, Washington, D.C. 20402 and are available for copying at the Indiana Department of Environmental Management, Indiana Government Center-North, 100 North Senate Avenue, Indianapolis, Indiana 46206-6015. *(Air Pollution Control Board; 326 IAC 3-5-3; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2067)*

326 IAC 3-5-4 Standard operating procedures
Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11
Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 4. (a) The owner or operator of each affected facility specified in section 1(b) of this rule, any facility subject to 326 IAC 12, or any other facility required to monitor emissions on a continuous basis shall submit to the department, within ninety (90) days after monitor installation, a complete, written continuous monitoring standard operating procedures (SOP). If revisions are made to the SOP, updates shall be submitted to the department biennially. At a minimum, the SOP shall describe complete step-by-step procedures and operations as follows:

(1) A description of the facility monitored.
(2) A listing of the following:
  (A) Each monitor's brand.
  (B) Model number.
  (C) Serial number.
  (D) Monitoring location.
  (E) Data handling and acquisition system.
(3) Examples of all reporting and log forms.
(4) Record keeping and reporting procedures that include the following:
  (A) Reporting of instrument precision and accuracy.
  (B) Reporting of emissions data.
(5) Methods and procedures for analysis and data acquisition.
(6) Calibration procedures that include the following:
  (A) Calibration error limits and linearity.
  (B) Calibration gas type, gas quality, and traceability to the National Institute of Standards and Technology.
  (C) Calibration frequency.
  (D) Criteria for recalibration, and analysis procedures to periodically verify the accuracy of span and calibration standards.
(7) Operation procedures that include daily procedures, quantifying and recording daily zero (0) and high level drift that meet the requirements of 40 CFR 60*, Appendix B, Performance Specification 2, Section 4.2 or other applicable regulations, and other operating parameter checks indicating correct operational status.
(8) Quality control and quality assurance procedures that include the following:
  (A) A statement of quality policy and objectives.
  (B) Organization and responsibilities description.
  (C) Calibration and span and zero (0) drift criteria.
  (D) Excessive drift criteria.
  (E) Corrective action for excessive drift.
  (F) Precision and accuracy audits.
  (G) Corrective action for accuracy audits failure.
  (H) Data validity criteria.
  (I) Participation in department audits.
  (J) Data recording and calculation audits.

(9) Preventive maintenance procedures and corrective maintenance procedures that include those procedures taken to ensure continuous operation and to minimize malfunctions.

(10) A listing of the manufacturer's recommended spare parts inventory.

(b) If a facility owner or operator fails to submit a SOP or submits a SOP that fails to address the factors provided under subsection (a), the department may require a performance evaluation pursuant to section 2 of this rule.

*Copies of the Code of Federal Regulations (CFR) referenced may be obtained from the Government Printing Office, Washington, D.C. 20402 and are available for copying at the Indiana Department of Environmental Management, Indiana Government Center-North, 100 North Senate Avenue, Indianapolis, Indiana 46206-6015. *(Air Pollution Control Board; 326 IAC 3-5-4; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2068)*

326 IAC 3-5-5 Quality assurance requirements

Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11

Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 5. (a) Except where 40 CFR 75* is applicable for affected facilities under the acid rain program, quality assurance requirements specified in this section and 40 CFR 60*, Appendix F, apply to continuous emission monitors that monitor the following:

(1) Carbon dioxide (CO_2).

(2) Carbon monoxide (CO).

(3) Hydrogen sulfide (H_2S).

(4) Nitrogen oxide (NO_x).

(5) Oxygen (O_2).

(6) Sulfur dioxide (SO_2).

(7) Total hydrocarbons (THC).

(8) Total reduced sulfur (TRS).

(9) Volatile organic compounds (VOC).

(b) Facilities that are subject to 40 CFR 75* shall follow the quality assurance procedures of 40 CFR 75* and report the results in accordance with subsection (e).

(c) Quality control (QC) requirements for continuous opacity monitoring systems (COMS) are as follows:

(1) For calibration drift (CD) assessment, the COMS shall be checked at least once daily. The CD shall be quantified and recorded at zero (0) (or low level) and upscale level opacity. The COMS shall be adjusted whenever the CD exceeds the specification of 40 CFR 60*, Appendix B, Performance Specification 1 (PS-1), and the COMS shall be declared out of control when the CD exceeds twice the specification of PS-1. Corrective actions, followed by a validating CD assessment, are required when the COMS is out of control.

(2) For fault indicators assessment, the fault lamp indicators, data acquisition system error messages, and other system self-diagnostic indicators shall be checked at least daily. Appropriate corrective actions shall be taken when the COMS is operating outside the preset limits.

(3) For performance audits, checks of the individual COMS components and factors affecting the accuracy of the monitoring data, as described in this subdivision, shall be conducted, at a minimum, on a calendar quarter basis. The absolute minimum checks included in the performance audit are as follows:

(A) The status of the optical alignment of the monitor components shall be checked and recorded according to the procedure

specified by the monitor manufacturer. Monitor components must be realigned as necessary.

(B) The apparent effluent opacity shall be compared and recorded before and after cleaning each of the exposed optical surfaces. The total optical surface dust accumulation shall be determined by summing up the apparent reductions in opacity for all of the optical surfaces that are cleaned. Caution should be employed in performing this check since fluctuations in effluent opacity occurring during the cleaning cycle may adversely affect the results.

(C) The zero (0) and upscale response errors shall be determined and recorded according to the CD procedures. The errors are defined as the difference (in percent opacity) between the correct value and the observed value for the zero (0) and high level calibration checks.

(D) The value of the zero (0) compensation applied at the time of the audit shall be calculated as equivalent opacity, corrected to stack exit conditions, according to the procedures specified by the manufacturer. The compensation applied to the effluent recorded by the monitor system shall be recorded.

(E) The optical pathlength correction ratio (OPLR) shall be computed from the monitor pathlength and stack exit diameter and shall be compared, and the difference recorded, to the monitor setup OPLR value. The stack exit correlation error shall be determined as the absolute value of the difference between the measured value and the correct value, expressed as a percentage of the correct value.

(F) A three-point calibration error test of the COMS shall be conducted. Three (3) neutral density filters meeting the requirements of PS-1 shall be placed in the COMS light beam path. The monitor response shall be independently recorded from the COMS permanent data recorder. Make a total of five (5) nonconsecutive readings for each filter. The low-range, mid-range, and high-range calibration error results shall be computed as the mean difference and ninety-five percent (95%) confidence interval for the difference between the expected and the actual responses of the monitor as corrected to stack exit conditions. These values shall be calculated using the procedure of PS-1, Section 8.0. The following are requirements for these values:

(i) The calibration error test requires the installation of an external calibration audit device (zero-jig). The zero-jig shall be adjusted to provide the same zero (0) response as the monitor's simulated zero (0).

(ii) Use calibration attenuators, that is, neutral density filters or screens, with values that have been determined according to PS-1, Section 7.1.3, “Attenuator Calibration”, and produce simulated opacities (as corrected to stack exit conditions) in the ranges listed in Table 1-2 in PS-1.

(iii) The stability of the attenuator values shall be checked at least once per year according to the procedures specified in PS-1. The attenuators shall be recalibrated if the stability checks indicate a change of two percent (2%) opacity or greater.

(4) The following are requirements for monitor acceptance criteria:

(A) The following criteria are to be used for determining if the COMS audit results are acceptable:

TABLE 1. PERFORMANCE AUDIT CRITERIA

Stack Exit Correlation Error	≤ 2 percent
Zero and Upscale Responses	≤ 2 percent opacity
Zero Compensation	≤ 4 percent opacity
Optical Alignment	Misalignment error ≤ 2 percent opacity
Optical Surface Dust Accumulation	≤ 4 percent opacity
Calibration Error	≤ 3 percent opacity

(B) The COMS is out of control whenever the results of a quarterly performance audit indicate noncompliance with any of the performance assessment criteria of Table 1 in clause (A). If the COMS is out of control, the owner or operator must take the action necessary to eliminate the problem. Following corrective action, the source owner or operator must reconduct the appropriate failed portion of the audit and other applicable portions to determine whether the COMS is operating properly and within specifications. The COMS owner or operator shall record both audit results showing the COMS to be out of control and the results following corrective action. COMS data obtained during any out of control period may not be used for compliance determination; the data may be used for identifying periods where there has been a failure to meet quality assurance and control criteria.

(C) Repeated audit failures, that is, out of control conditions resulting from the quarterly audits, indicate that the QC procedures are inadequate or the COMS is incapable of providing quality data. The source owner or operator shall increase the frequency of the above QC procedures until the performance criteria are maintained or modify or replace the COMS whenever two (2) consecutive quarters of unacceptable performance occur.

(5) The performance audit calculations contained in PS-1, Section 8 shall be followed.

(d) Except where 40 CFR 75* is applicable for affected facilities under the acid rain program, quality control requirements for flow monitoring systems are as follows:

(1) For CD assessment, the flow monitoring system shall be checked at least once daily. The CD shall be quantified and recorded at zero (0) (or low level) and upscale level. The flow monitoring systems shall be adjusted whenever the CD exceeds the specification of 40 CFR 60*, Appendix B, Performance Specification 6 (PS-6), and the flow monitoring systems shall be declared out of control when the CD exceeds twice the specification of PS-6. Corrective actions, followed by a validating CD assessment, are required when the flow monitoring system is out of control.

(2) An annual relative accuracy test.

(e) Reporting requirements for performance audits are as follows:

(1) Owners or operators of facilities required to conduct:

(A) cylinder gas audit;

(B) relative accuracy test audit; or

(C) continuous opacity monitor calibration error audit;

on continuous emission monitors shall prepare a written report of the results of the performance audit for each calendar quarter, or for other periods required by the department. Quarterly reports shall be submitted to the department within thirty (30) calendar days after the end of each quarter.

(2) The performance audit report shall contain the following information:

(A) Plant and monitor information, including the following:

(i) The plant name and address.

(ii) The monitor brand, model, and serial number.

(iii) The monitor span.

(iv) The monitor location, for example, duct, boiler, unit, or stack designation.

(B) Performance audit information, including the following:

(i) The auditor's name.

(ii) A copy of the audit standard's certification, for example, the vendor's Protocol 1 certification, or neutral density filter certification.

(iii) All data used to calculate the audit results.

(iv) The audit results and an indication if the monitor passed or failed the audit. If the performance audit results show the CEMS or COMS to be out of control, the CEMS or COMS owner or operator must report both the audit results showing the CEMS or COMS to be out of control and the results of the audit following corrective action showing the COMS to be operating within specification.

(v) Any corrective actions performed as the result of a failed audit.

(f) If a relative accuracy test audit of any continuous emission monitor listed in subsection (a) is performed, the department must be notified at least thirty-five (35) days prior to the audit.

*Copies of the Code of Federal Regulations (CFR) referenced may be obtained from the Government Printing Office, Washington, D.C. 20402 and are available for copying at the Indiana Department of Environmental Management, Indiana Government Center-North, 100 North Senate Avenue, Indianapolis, Indiana 46206-6015. *(Air Pollution Control Board; 326 IAC 3-5-5; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2069)*

326 IAC 3-5-6 Record keeping requirements

Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11

Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 6. (a) On and after the certification of a monitoring system, the owner or operator of a source subject to this rule shall maintain records, including raw data, of all monitoring data and supporting information for a minimum of five (5) years from the date of any of the following:

(1) A monitoring sample.

(2) A measurement.

(3) A test.

(4) A certification.

(5) A report.

(6) Any other activity required under this article.

(b) The records described in subsection (a) shall include the following:

(1) All documentation relating to:

(A) design, installation, and testing of all elements of the monitoring system; and

(B) required corrective action or compliance plan activities.

(2) All maintenance logs, calibration checks, and other required quality assurance activities.

(3) All records of corrective and preventive action.

(4) A log of plant operations, including the following:

(A) Date of facility downtime.

(B) Time of commencement and completion of each downtime.

(C) Reason for each downtime.

(c) The owner or operator of a source subject to this rule shall maintain the records required by this section at the source, or at such other site, in a manner so that they may be inspected by the department or the U.S. EPA, if so requested or required. *(Air Pollution Control Board; 326 IAC 3-5-6; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2071)*

326 IAC 3-5-7 Reporting requirements

Authority: IC 13-14-8; IC 13-17-3-4; IC 13-17-3-11

Affected: IC 13-14-4-3; IC 13-15; IC 13-17

Sec. 7. The following reporting requirements apply to sources subject to this rule:

(1) Sources subject to the requirements of section 1 of this rule shall report excess emissions no less frequently than quarterly. For sources required to report quarterly, such reports shall be:

(A) submitted by the facility owner or operator to the department; and

(B) postmarked or delivered by other means no later than thirty (30) calendar days following the last day of the reporting period.

(2) If a permit specifies or a rule requires more frequent reports, such reports shall be:

(A) submitted by the facility owner or operator to the department; and

(B) postmarked or delivered by other means no later than fifteen (15) calendar days after the end of each month.

(3) Gaseous excess emissions data reports shall be reported using three (3) hour block periods ending at 03:00, 06:00, 09:00, 12:00, 15:00, 18:00, 21:00, and 24:00. For facilities that must demonstrate compliance with hourly (one (1) hour), daily (twenty-four (24) hour) average, or thirty (30) day averages, such information shall be submitted as part of the quarterly report required in this section.

(4) The monitoring report shall contain the following continuous monitoring information summaries, with all times reported in real time:

(A) Monitored facility operation time during the reporting period.

(B) Excess emissions or parameters, as applicable, reported in units of the standard, or the applicable parameter unit as follows:

(i) Date of excess emissions, or other applicable dates.

(ii) Time of commencement and completion for each applicable parameter deviation or excess emission data.

(C) Magnitude of each excess emission as follows:

(i) For opacity as follows:

(AA) The actual percent opacity of all six (6) minute (block) averages exceeding the applicable opacity limit shall be reported. If the exceedance occurs continuously beyond one (1) six (6) minute period, the percent opacity for each six (6) minute period or

the highest six (6) minute average opacity for the entire period shall be reported.

(BB) For department approved opacity averaging times other than six (6) minutes, the actual percent opacity of each averaging period in excess of the applicable limit shall be reported.

(CC) A summary by cause shall be prepared and submitted as part of this report itemizing exceedances by cause.

(ii) For gaseous emissions, the excess emissions, in units of the applicable standard, must be reported based on the applicable averaging time, for example, one (1) hour block, three (3) hour block, three (3) hour rolling, in addition to any other reporting requirements that may be applicable. The averaging time is specified in the applicable federal or state rules, or facility operating permit.

(5) Continuous monitoring system instrument downtime, except for zero (0) and span checks, which shall be reported separately, shall include the following:

(A) Date of downtime.

(B) Time of commencement.

(C) Duration of each downtime.

(D) Reasons for each downtime.

(E) Nature of system repairs and adjustments.

(Air Pollution Control Board; 326 IAC 3-5-7; filed Jan 30, 1998, 4:00 p.m.: 21 IR 2071)

ATTACHMENT 3

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
NONRULE POLICY DOCUMENT

Title: Continuous Opacity Monitor Correlation Guidelines
Identification Number: Air-012-NPD
Date Originally Adopted; April 10. 197
Date Revised: None
Other Policies Repealed or Amended: None
Brief Description of Subject Matter: Provides guidelines for correlation of opacity data for an alternate Continuous Opacity Monitor (COM) location.
Citations Affected: 326 IAC 3-1.1-2(5), Performance Specification 1

This nonrule policy document is intended solely as guidance and does not have the effect of law or represent formal Indiana Department of Environmental Management (IDEM) decisions or final actions. This nonrule policy document shall be used in conjunctions with applicable laws. It does not replace applicable laws, and if it conflicts with these laws, The laws shall control. A revision to this nonrule policy document may be put into effect by IDEM once the revised nonrule policy document is made available for public inspection and copying IDEM will submit revisions to the Indiana Register for publication.

The purpose of this nonrule policy is to provide guidelines to be used by sources that are proposing an alternative location for a Continuous OpacityMonitor (COM).

Background

Federal regulations at 40 CFR 60, Appendix B, Performance Specification 1 require that continuous monitoring equipment meet certain specifications when used to demonstrate compliance with regulatory requirements. Section 4 of Appendix B, Performance Specification 1 provides installation requirements for a COM which would assure that representative data is collected. Indiana rules at 326 IAC 3-1.1-2 reference the Performance Specification 1 requirements for the installation of a COM. As with the federal regulations, Indiana rules also allow a source to propose an alternate location for the COM (326 IAC 3-1.1-2(5)).

Policy

The following are guidelines for correlating continuous opacity monitor (COM) data with visible emissions data or with a reference continuous opacity monitor for the purpose of approving an alternate monitoring location. The alternate monitoring location is one which does not meet the criteria specified under 40 CFR 60, Appendix B, Performance Specification 1 (PS-1), Section 4.

There are type types of correlation testing which may be performed; only one of the two needs to be conducted in order to validate the alternate monitor location. Any COM involved in the correlation testing must complete a calibration cycle (zero/upscale calibration) both before and after the correlation test period. If the daily calibration occurred not longer than two (2) hours prior to the initiation of the correlation period, that will satisfy the requirement for the pre-test calibration. If either the pre- or

post-test calibration is invalid and must be repeated after the COM is repaired and calibration drift criteria met.

Visible emissions vs. COM

While operating at or near maximum production capacity as identified in the permit, conduct visible emissions readings in accordance with 40 CFR 60, Appendix A, Method 9 for a period of not less than two (2) hours. Visible emissions data will be calculated using the average of each 6-minute block average of two (20 certified Method 9 readers (at least one of these readers must be from IDEM-OAQ).

During this time, boilers must conduct soot blowing and/or ash pulling on a frequency and duration representative of normal operations. Other processes should use other means to vary the opacity of the emissions; this may be accomplished by altering operations of a PM control device or by ramping of the production rates.

A VE/COM correlation will be considered acceptable and the alternate location approved provided the relative accuracy is $\leq$20%. Relative accuracy is based on the absolute value of the mean difference between the readings, the 2.5% error confidence coefficient and the average of the Method 9 readings or the applicable opacity standard (when the standard is less than 10% opacity). The relative accuracy is calculated as follows:

1. Summarize the results in tabular form, similar to Figure A.
2. Calculate the mean of the Method 9 values and the mean of the opacity values for the am period.
3. Calculate the arithmetic differences between the Method 9 and the COM data output sets.
4. Calculate the mean of the differences, the standard deviation, coefficient and relative accuracy.

Figure A

	A	B	A-B	$(A-B)^2$
6-minute average	Method 9 Average (reader 1 + reader 2)/2	COM 6-minute Average		
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

19				
20				
Avg.				

COM vs COM

While operating at or near maximum production capacity as identified in the permit, collect 6-minute opacity averages from two (2) COMS. One of these COMs must be at an acceptable location per PS-1 siting criteria and the other should be at the alternative location which the source wants approved.

A COM/COM correlation will be considered acceptable, and the alternate location approved provided one of the two following conditions are met:

A. The arithmetic difference between the average 2-hour opacity (calculated as the average of the twenty (20) 6-minute averages) for the two monitors is less than +/-10% of the average reference value.

B. The arithmetic difference between the two average opacity values is less than 2% opacity.

Example:

	Approved COM (reference)	Alternate Location COM
Avg. 2-hour Opacity:	35%	32%

10% of the reference value is 3.5% opacity and the arithmetic difference between the two values is 3% opacity. As described in Section 4.3 of PS-1, the alternate location is acceptable.

If you have any questions concerning the information provided in this nonrule policy document, please contact Dave Cline at (317)-233-5668.

ATTACHMENT 4

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
NONRULE POLICY DOCUMENT

Title: **Continuous Emissions Monitoring Report Format**
Identification Number: **Air-010-NPD**
Date Originally Adopted: **April 10, 1997**
Dates Revised: **None**
Other Policies Repealed or Amended: **None**
Brief Description of Subject Matter: **Required information for monthly or quarterly CEM reports for compliance with 326 IAC 3-1.1-3**
Citations Affected: **326 IAC 3-1.1-3**

This nonrule policy document is intended solely as guidance and does not have the effect of law or represent formal Indiana Department of Environmental Management (IDEM) decisions or final actions. This nonrule policy document shall be used in conjunction with applicable laws. It does not replace applicable laws, and if it conflicts with these laws, the laws shall control. A revision to this nonrule policy document may be put into effect by IDEM once the revised nonrule policy document is made available for public inspection and copying. IDEM will submit revisions to the Indiana Register for publication.

The purpose of this nonrule policy document is to clarify the information that is required to be submitted concerning continuous emissions monitoring in accordance with 326 IAC 3-1.1-3, Notification, record keeping, reporting.

Policy

The monthly or quarterly continuous emissions monitoring report submitted to IDEM should contain the information listed below. Reports should be sent to:

Chief, Compliance Data Section
Office of Air Quality
100 North Senate Ave
P.O. Box 6015
Indianapolis, IN 46206-6015

Monthly reports must be received by the Office of Air Quality (OAQ) within 15 calendar days after the end of the month and quarterly reports must be received by the OAQ within 30 calendar days after the end of the quarter. All times must be reported in real time.

The following information shall be reported:

A. Plant Operations Summary
For the applicable reporting period (total hours of operation).

B. Excess Emissions Summary
Excess emissions shall be reported in units of the applicable standard.
1. Date of excess emissions
2. Time of commencement and completion of excess emissions

3. Magnitude of excess emissions
   (a) For opacity exceedances, report:
   (i) The actual percent opacity of all 6-minute (block) averages exceeding the standard. If the exceedance occurs continuously beyond one 6-minute averaging period, the percent opacity for each 6-minute average or the highest 6-minute average for the entire period shall be reported.
   (ii) For other OAQ approved averaging times, the actual percent opacity of each averaging period in excess of the applicable opacity standard. For example, a source with a 30-minute averaging period should report each exceedance of the 30-minute standard.

   (b) For gaseous emissions, the excess emissions in units of the applicable standard (1-hour blocks, 3-hour blocks, 3-hour rolling) shall be reported. The averaging time is specified in the applicable Federal/State rule and/or the facility operating permit.
4. Reason or cause for the excess emissions
5. Corrective actions taken or measures taken to minimize emissions

C. CEMS Instrument Downtime Summary
1. Date of downtime
2. Time of commencement of downtime
3. Duration of downtime
4. Reasons for the downtime
5. Nature of system repairs and adjustments

NOTE: A log of all CEM downtime, repairs, adjustment, maintenance, calibration, audits and testing shall be maintained and made available for review by IDEM, EPA or their authorized representative.

Quality Assurance Activities

Please note that after the effective date of the Article 3 revisions, all sources conducting continuous emissions monitoring for compliance with State or Federal requirements will be required to conduct and submit reports on quality assurance activities.

If you have any questions concerning the information provided in this nonrule policy document